BULLETIN OF THE HISTORY OF MEDICINE

ORGAN OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE
AND THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Editor—HENRY E. SIGERIST

VOLUME VII NOVEMBER, 1939 NUMBER 9

MEDICINE IN UTOPIA *

HERBERT SILVETTE

For every Doctor Pangloss who finds all for the best in this best of possible worlds, there are a hundred who feel that things could hardly be worse. Ninety-nine of these express their dissatisfaction by grumbling against Providence or by booting the cat over the doorsill, but the hundredth devises a Utopia in his thoughts, and sometimes even sets it down on paper.

It is a somewhat chastening thought for the medical profession to observe that Physic, no less than Politics and Poetry, has been weighed and found wanting by these architects of ideal states. Some, like Plato, have found the medical practice of their day too efficient for the good of their commonwealth; others, like Bacon, would raise the power and function of the physician to heights undreamed of by Aesculapius himself. And on examining the succession of ideal states (for these have this in common with our actual ones: they are all impermanent), we are confronted with a series of sidelights which illuminate, not only contemporary medical practice, but also the position of Medicine in actual and idealized society as well.

The earliest of the ideal commonwealths we shall consider was the

* From the Pharmacological Laboratory, University of Virginia Medical School.

Read before the Section of Historical and Cultural Medicine of the New York Academy of Medicine, May 10, 1939.

Republic of Plato. Plato it was who first set his mind to make men better by "choice dissertations about utopias." He was the first, in Mr. Norman Douglas's words, "to sit in marble halls and have a fair and fondly ardent *jeunesse dorée* reclining about [his] knees while [he] discoursed, in rounded periods concerning the salvation of their souls by means of transcendental Love."[1] No Platonist will swallow without protest Mr. Douglas's characterization of the founder of the Republic, but I quote it with approval here; for if, as Coleridge once observed, all men are born either Platonists or Aristotelians, then few physicians are in the former category.[2] A medical audience should have as little patience as Mr. Douglas with Plato's "twilight world of abstractions" and with his hatred of a fact. Most of us have discarded, if indeed the medical profession has ever fully subscribed to the Platonic "know thyself." Our idea of virtue is to investigate patiently the facts of life. It is necessary to recognize the incompatibility of Plato and Physic, for when this is clear his lowly opinion of physicians may be properly discounted.

Doctor Osler once pointed out that, in the nine grades of human existence into which Platonic souls pass—from that of a philosopher to that of a tyrant—the physician falls into the fourth class along with the lover of gymnastic toils. Nevertheless, Doctor Osler continued, though Plato assigned the physician a place in the middle tier of his mystery, he welcomed him socially into the most select and aristocratic circle of Athens; for:

> In that most festive of all festal occasions, at the house of Agathon, described in the Symposium, Eryximachus, a physician and the son of one, is a chief speaker, and in his praise of love says, "from medicine I will begin that I may do honor to my art."[3]

We can only conclude that Athenian society was more perspicacious than Athenian philosophers.

In his Republic Plato will have neither poets nor physicians within

[1] *Old Calabria.* New York [1928], p. 427. (Modern Library edition)

[2] Dr. Ramsay Spillman of New York, who discussed this paper, made the penetrating observation that the distinction between Aristotelianism and Platonism is of fundamental importance to the medical profession, for it is the difference between science and the cults.

[3] William Osler: "Physic and physicians as depicted in Plato." Boston Medical and Surgical Journal, *128*: 155, 1893.

the city walls. Should one of the former come into the city and offer to read his poems:

> . . . we should revere him as a sacred, admirable and pleasant person, but we should tell him that there is no such person with us in our city, nor is there any such allowed to be, and we should send him out to some other city, pouring oil on his head and crowning him with wool.[4]

But the physician who settled in the town would meet an even unkinder fate, for he would have found flourishing among its inhabitants a kind of Christian Science sanctified by the state. Plato's aim was to turn his citizens into perfect philosophers by so breeding and educating them that they arrived at maturity with perfect souls. And a good soul, said Plato, by its virtue renders the body the best which is possible. In a word, a sound or a sick soul meant a sound or a sick body, and no sick souls were allowed. It seems never to have seriously entered his mind that the converse proposition might contain even more truth: the sounder the body, the sounder the soul. Later Utopians, as we shall see, do full justice to this physician's point of view.

We may dispense with Plato's philosophical subtleties regarding the relationship between the body and the soul [Mr. Douglas has called them "distracted dialectics"], but we cannot pass in silence his treatment of the physicians. He considered, quite reasonably, that physicians "would become most expert if, beginning from their infancy, they would in learning the art be conversant with the greatest number of bodies, and these the most sickly."[5] This indeed is our modern clinical training, and had Plato stopped the education of his physicians at this point, one would have had no quarrel with him. But he thought that doctors, besides learning about disease at second-hand, should "labour themselves under all manner of diseases"; that doctors should not, in fact, be "by natural constitution quite healthy." This is the principle of "know thyself" *reductio ad absurdum*, surely a sacrifice to Aesculapius which physicians need not be required to make.[6]

[4] *The Republic of Plato*, translated by H. Spens. London, n. d., p. 83. (Everyman's Library edition)

[5] *Ibid.*, p. 97.

[6] Dr. Spillman here observed that a man sometimes makes a better physician who

It was the function of Plato's state physicians "carefully to preserve for you those of your citizens who are of goodly constitutions both in mind and in body; and with respect to those who are otherwise, they shall suffer to die." [7] He insinuates that Aesculapius, by means of gold, was prevailed upon to cure a dying rich man for which he was struck by a thunderbolt. "If he were the son of God," says Plato, "he was not given to filthy lucre; or, if he were given to filthy lucre, he was not a son of God." [8]

The traditional form of the Aesculapius legend is this: Aesculapius by his skill snatched so many people from the grave that emigration to the underworld sadly declined; whereupon Pluto complained to Jupiter, and the latter slew the too-skilful physician with a thunderbolt. But Plato has twisted the fable to serve as a double attack upon the God of Medicine. After arguing first that the function of the physician is to suffer the chronically ill to die, he reproaches Aesculapius for having enabled one to live. Furthermore, Aesculapius accepted money for his cure, thus piling sin upon sin. But is not the doctrine that the labourer is worthy of his hire earlier than St. Luke?

In another place Plato tells how Herodicus, a contemporary physician respectfully known of medical historians, had the misfortune to grow infirm. But he mixed exercise and medicine together with such wisdom that, "struggling long with death, he arrived at old age." "A mighty reward," sneers Plato, "he reaped of his art"; and goes on to say that Aesculapius himself was not ignorant of this method of cure, but that the God of Medicine did not discover it to his descendants because it was not fit or virtuous that a man be allowed the leisure or pleasure of being sick the whole of his life.[9]

All this is distracted dialectic with a vengeance. Plato must have been singularly unimpressed by the Aesculapian ethics to have so misinterpreted the function of the physicians of his own time. It was not in civilized communities like Athens or in a profession headed

has actually suffered from the disease he treats, and he illustrated his point by "that inspired medical community of Saranac Lake, where tuberculosis is treated with maximum success by physicians who understand the complex psychology of tuberculous patients because they themselves are of the number." I agree with Dr. Spillman, though it should be remembered that the "know thyself" on which part of the Saranac success rests is not the same, philosophically, as the original Platonic principle.

[7] *The Republic*, p. 98. [8] *Ibid.*, p. 96. [9] *Ibid.*, p. 93-4.

by the divine Hippocrates that medical men cured the acute cases and cold-bloodedly let the chronic ones die.

Plato has, however, put his finger on one weakness of medical practice, although physicians themselves have always appreciated the problem.

> A smith [says Plato] when he falls sick, thinks it fit to take from the physician some potion, to throw up his disease or purge it downwards, or by means of caustic or amputation to get quit of the trouble; but if anyone prescribe for him a long regime, putting caps on his head, and other such things, he quickly tells him that he hath not leisure to lye sick, nor doth it avail him to live in this manner, attentive to his trouble and negligent of his proper work; and so, bidding such a physician farewell, he returns to his ordinary diet and if he recovers his health, he continues to manage his own affairs; but if his body be not able to support, he dies, and is freed from troubles![9]

A rich man, on the other hand, has the "leisure of being sick the whole of life, attentive only to the taking of medicines." For this excessive attention to one's diseases, which is a great obstacle (to Plato's way of thinking) to the practice of virtue and improvement in it, he offers a remedy of which no physician was ever ignorant: the cure of hard and necessary work. Surely, though, the incidence of hypochondria was not so high that the elaboration of a whole system of state medicine was necessary to chase a few rich Athenian Argans from their beds. Nor was hypochondria the only luxury from which smiths were interdicted by poverty: listening to Platonic discourses in the park of Academos was another.

Though Plato felt that there was no greater mark of a bad city than the need of physicians and hospitals, yet he did not banish medical men as he did poets. He admitted the necessity of practitioners to cope with wounds and epidemical distempers[10]—to be wounded in defense of the *Republic* was undoubtedly a virtue, and to be smitten by an epidemical distemper was a lapse from virtue only on the part of the gods. But "to stand in need of the medical art through sloth and intemperate diet, filled with rheums and wind, like lakes, obliging the skilful sons of Aesculapius to invent new names to diseases, such as dropsies and catarrhs—do you not think this abominable," he asks.[10] There would be no such skilful sons in *his* Republic.

[10] *Ibid.*, p. 93.

Now that we have considered the place of physic and physicians in Plato's commonwealth, let us try to analyze the surprisingly degraded status which it suppositiously occupied there. I do not believe it was due to the state of physic in Plato's time, nor to the quality of the contemporary practitioners: one has only to study the *Corpus Hippocraticum* to be convinced of that. It was due, rather, to Plato himself, or more precisely, to the state of the philosopher's health.

Plato lived to a ripe old age, dying in his eighty-first year after a life of constant labour, some physical peril, but apparently no serious ill-health. We have all known people who, as they proudly tell us, "have never had a sick day in their lives"; and we know too how impatient they usually are with the illnesses of others. It is a common type, and (if I interpret the *Republic* rightly) Plato was the archetype. Indeed, while rereading my medical notes on the *Republic* I was reminded of Mr. Clarence Day's father. The elder Mr. Day declared that when people thought they were ill, it didn't mean that there was anything the matter with them, it was merely a sign of weak character.[11] He said illnesses were mostly imaginary and he didn't believe in them. He called them poppy-cock; and when his wife asked him how he would cure them, he said he would tell them, "Bah!"[12]

In sum, there had been no place in Plato's life for physic and physicians (except socially in the *Symposium*); consequently there was no place for Medicine in his utopia. We shall see all along, in considering the other ideal states, that just as the political and social structure of a commonwealth is the reflection of its architect's environment, so is the position of Medicine therein the shadow of his constitution, his diseases, and his attitude towards his own ills.

Plato may be broadly distinguished from his successors in that these represent their ideal communities as already existing and only needing to be described, whereas his Republic exists merely in thought, and not even there until it has been provided with a sophistical basis by a preliminary discussion of the abstract principles involved. It is a welcome relief, therefore (and not only on the literary

[11] The word "character" as Mr. Day uses it here has precisely the same significance as the Platonic "virtue."

[12] *Life with Father*. New York, 1935, pp. 21-9, "Father is firm with his ailments."

side), to turn to Sir Thomas More and his *Utopia*, the next commonwealth on our list.

The *Utopia* was written in Latin in 1516, and first translated into English in 1551.[13] Of it Thomas Fuller wrote:

> Among [More's] Latin Books his *Utopia* beareth the Bell, containing the *Idea* of a compleat Common-wealth in an Imaginary Island (but pretended to be lately discovered in *America*) and that so lively counterfeited, that many at the reading thereof mistook it for a real truth. Insomuch, that many great Learned men, as *Budeus*, and *Johannes Paludanus*, upon a fervent zeal, wished that some excellent *Divines* might be sent thither to preach *Christs* Gospel; yea, there were here amongst us at home sundry good men and Learned *Divines*, very desirous to undertake the Voyage to bring the People to the Faith of Christ, whose manners they did so well like.[14]

In the *Republic* Plato argues that a surcease from sickness and pain is no true pleasure, but merely a deceit experienced by those who have no experience in the Platonic virtue [Platonic dialectic, really]. But the Utopians, says More, in a rambling refutation of this conclusion:

> . . . have long ago rejected and condemned the opinion of them, which said that quiet and steadfast health . . . ought not therefore to be counted a pleasure, because they say it cannot be presently and sensibly perceived and felt by some outward motion. But of the contrary part, now [the Utopians] agree almost all in this, that health is a most sovereign pleasure. For seeing that in sickness (say they) is grief, which is a mortal enemy to pleasure, even as sickness is to health, why should not then pleasure be in the quietness of health? For they say it maketh nothing to this matter, whether you say that sickness is a grief, or that in sickness is grief; for all cometh to one purpose. . . . Is there any man so possessed with stonish insensibility, or with the sleeping sickness, that he will not grant health to be acceptable to him and delectable? But what other thing is delectation than that which by another name is called pleasure?[15]

It is precisely this attitude towards disease which distinguishes

[13] My quotations are taken from H. Goitein's edition (in the series of Broadway Translations) of Ralph Robinson's first English translation. More, followed by page number, will thus refer to *Sir Thomas More's Utopia and Francis, Lord Bacon's New Atlantis*, London [1925].

[14] *History of the Worthies of England.* London, 1662, under "London—Statesmen."

[15] More, p. 131. *Cf.* Plato's *Republic*, Bk. IX (Everyman's Library edition, p. 304).

the *Republic* and the *Utopia.* Were we to weigh, on the scales Aristophanes used to balance the verses of Aeschylus and Euripides, the skilful sophistry of Plato and the naïve reasoning of More, there would be no doubt which set of arguments would kick the beam. The Renaissance Englishman is no match for the wily Athenian philosopher. But physicians are now less concerned with sophistry than with humanitarianism and human nature, and here Sir Thomas More writes in words he can understand. More " was wont to say that his *natural temper was so tender, that he could not indure a philip* [fillip] "; [16] certainly it was tender enough to have taken great pains to ensure the Utopians the best of medical care.

As More elaborates the fable of a voyage to Utopia, he writes that one of the travellers:

> . . . carried with him physic books, certain small works of Hippocrates, and Galen's Microtechne, the which book they have in great estimation. For though there be almost no nation under heaven that hath less need of physic than they, yet this notwithstanding, physic is nowhere in greater honour; because they count the knowledge of it among the goodliest and most profitable parts of philosophy. For while they by the help of this philosophy search out the secret mysteries of nature, they think that they not only receive thereby wonderful great pleasure, but also obtain great thanks and favour of the Author and Maker thereof.[16]

The travellers found the inhabitants of Utopia much given to pleasures of the body, pre-eminent among which was the pleasure of health. " For the delight of eating and drinking and whatsoever hath any like pleasantness, they determine to be pleasures much to be desired, but not otherwise than for health's sake." [17]

They consider, naturally, that it is a wise man's part rather to avoid sickness than to wish for medicines; and it would seem that it was an important part of the Utopian physician's task to prevent as well as cure various distempers. " Neither they suffer anything that is filthy, loathsome, or uncleanly, to be brought into the city, lest the air, by the stench thereof infected and corrupt, should cause pestilent diseases." [18] This concept of preventive medicine is indeed a very praiseworthy one, for it meets the question on physical, not philosophical grounds.

[16] More, p. 137-8. [17] More, p. 132. [18] More, p. 104.

Utopia was well endowed with hospitals, for More seems to have realized the deficiencies of his own times in that respect. At the time the book was written, there were no public hospitals in London with the exception of St. Bartholomew's, and from the kindly care with which More supplied his ideal city, we may assume that even St. Bartholomew's left much to be desired:

> In the circuit of the city, a little without the walls, they have four hospitals; so big, so wide, so ample, and so large, that they may seem four little towns; which were devised of that bigness, partly to the intent the sick, be they never so many in number, should not lie too throng or strait, and therefore uneasily and incommodiously; and partly that they which were taken and holden with contagious diseases, such as be wont by infection to creep from one to another, might be laid apart far from the company of the residue. These hospitals be so well appointed, and with all things necessary to health so furnished; and moreover so diligent attendance through the continual presence of cunning physicians is given, that though no man be sent thither against his will, yet notwithstanding there is no sick person in all the city, that had not rather lie there than at home in his own house.[19]

The inhabitants of the city were fed in common halls, each in charge of a steward. These stewards daily came to the meat-markets, where they received their necessary share of provender, but only after the stewards assigned to the hospitals had received such meats as the physicians had prescribed.[20]

Thus the sick were seen to with great affection, and no means were spared, either medicinal or dietary, whereby they might be restored to health. But if this is not possible, More would permit euthanasia:

> Them that be sick of incurable diseases they comfort with sitting by them, with talking with them, and, to be short, with all manner of helps that may be. But if the disease be not only incurable, but also full of continual pain and anguish, then the priests and the magistrates exhort the man, seeing he is not able to do any duty of life, and overliving his own death is noisome and irksome to others, and grievous to himself; that he will determine with himself no longer to cherish that pestilent and painful disease: and seeing his life is to him but a torment, that he will not be unwilling to die, but rather take a good hope to him, and either dispatch himself out of that painful life, as out of a prison or a rack of torment, or else suffer himself willingly to be rid out of it by other. . . . They that be thus persuaded finish their lives willingly, either with hunger, or else die in their sleep [by opiates] without

[19] More, p. 104-5.

[20] More, p. 105.

any feeling of death. But they cause none such to die against his will; nor they use no less diligence and attendance about him.[21]

Compare this beautiful passage with Plato's austere injunction: " such as are [of bad constitution] in their bodies, they shall suffer to die."

How much the high position of the Utopian physician was due to the humanism of the age, and how much to Sir Thomas More's tender temper, is a question which need not be resolved. It is sufficient to point out the contrast between the *Republic* and the *Utopia* in matters medical, and to call attention to the essential similarity of More's humanitarian viewpoint with our own.

The City of the Sun[22] (published in 1620) was written while its author, a Franciscan friar named Thomas Campanella, was in prison on the charge of conspiring to overthrow the kingdom of Naples and found a republic. In all, Campanella spent twenty-seven of his seventy-one years in fifty different prisons, and was seven times tortured along the way. Once he was set upon the " she-goat," with heavy weights attached to his feet, the sharp edges and spikes of the infernal machine meanwhile pressing slowly and deeply on the tenderest portions of his body. He tells us in the preface to one of his books that in this way a pound and a half of his flesh was macerated, and ten pounds of his blood shed. It is a noteworthy fact, therefore, that in spite of its author's sufferings, *The City of the Sun* should not only show no trace of bitterness, but should consistently maintain the loftiest ideals. One cannot help feeling that the tender mercies of the physicians were more real than the " tender mercies " of the Inquisition, for Campanella reveals throughout his work an appreciation of the Apollonian art.

Like More's *Utopia, The City of the Sun* is cast in the form of a romance, wherein a Genoese sea-captain tells of his experiences in an ideal city. The government of the state is in the hands of a hierarchy, headed by a priest called (in our language) *Metaphysic*. Under *Metaphysic* are three assistants, *Power, Wisdom* and *Love. Wisdom*

[21] More, p. 141-2.

[22] The *Civitas Solis seu idea reipublicae philosophicae* was first translated into English by T. W. Halliday in 1885. My quotations are taken from *Ideal Empires and Republics*, edited by Andrews, Washington and London, 1901.

is the ruler of the liberal arts and sciences and medicine, and possesses a book in which all the sciences are written with conciseness and marvellous fluency of expression. There are also in the city several kinds of museums in which are to be found live specimens of all known plants labelled with explanations of their uses in medicine. With Campanella we come, indeed, to a consideration of medicines as well as Medicine. He mentions, in a sort of wishful thinking with which, under the circumstances, one can readily sympathize, vessels " full of liquids one to three hundred years old, which cure all diseases " [23] and " a secret for renovating life after about the seventieth year, and for ridding it of affliction, [which] they do by a pleasing and indeed wonderful art." [24] Poor Campanella! It was no wonder that his mind dwelt on a wonderful secret for removing affliction from a life all too full.

The physicians of the City of the Sun were selected according to the natural ability of the candidates. Around the walls of the city were painted a series of pictures illustrating the mechanical arts, from which the children effortlessly and pleasantly learned all the sciences. Their tutors soon ascertain the bent of each scholar, and those deemed qualified then devote themselves to the study of medicine.

The duties of the physician are detailed and manifold: to tell the cooks what repasts shall be prepared on each day, and what food to prepare for the old, the young and the sick. Women were advised how long to suckle their infants; boys were forbidden to drink wine except on the advice of the physician. It was even the doctor's duty to see that the populace washed its body frequently, and changed its clothes four times a year, in spring, summer, fall and winter when the sun entered the constellations of Aries, Cancer, Libra and Capricorn. Here too, as in the *Utopia,* we see a well-considered and practicable system of preventive medicine, which calls for such sound hygienic principles as burning rather than burying dead bodies, so that the plagues which the earlier centuries so dreaded would not arise.

In a long passage [24] Campanella goes into curious detail concerning the diseases to which the inhabitants were particularly liable, and

[23] *Ideal Empires and Republics,* 1901, p. 279.
[24] *Ibid.,* p. 306-7.

reading between the lines we may perhaps guess at some of the troubles he had with his own constitution:

Among them is never gout in the hands or feet, no catarrh, no sciatica, nor grievous colics, nor flatulency, nor hard breathing. . . . They suffer rather from swellings or from the dry spasm, which they relieve with plenty of good and juicy food.

Campanella was evidently not himself exposed to sins of indulgence. "Plenty of good and juicy food"—a pitiful comment on the dry and scanty prison fare on which he must have been subsisting as he penned the words.

They heal fevers [Campanella continues] with pleasant baths and with milk foods, and with a pleasant habitation in the country and by gradual exercise. . . . They cure hot fevers with cold potations of water, but slight ones with sweet smells, with cheese bread or sleep, with music or dancing. Tertiary fevers are cured by bleeding, by rhubarb or by a similar drawing remedy, or by water soaked in the roots of plants, with purgative and sharp-tasting qualities. But it is rarely that they take purgative medicines. Fevers occuring every fourth day are cured easily by suddenly startling the unprepared patients, . . .

[Here I must digress to describe a cure performed by the humourous old Elizabethan physician, William Butler. As Aubrey tells the tale:[25] "The Dr. lyeing at the Savoy in London, next the water side, where was a balcony look't into the Thames, a patient came to him was grievously tormented with an ague. The Dr. orders a boate to be in readinesse under his windowe, and discoursed with the patient (a gentleman) in the balcony, when on a signall given, 2 or 3 lusty fellowes came behind the gentleman and threw him a matter of 20 feete into the Thames. This surprise absolutely cured him." Doctor Butler, like Mr. Day's father, did not believe in coddling disease.]

They take more diligent pains to cure the lasting fevers [Campanella goes on], which they fear more, and they strive to counteract these by the observation of stars and planets, and by prayers to God. . . .

They use baths, and moreover they have warm ones according to the Roman custom, and they make use also of olive oil. They have found out, too, a great many secret cures for the preservation of cleanliness and health. And in other ways they labour to cure the epilepsy, with which they are often troubled.

---

[25] John Aubrey: *Brief Lives*, edited by A. Clark. Oxford, 1898, vol. I, p. 141.

All this time the sea-captain has been talking, but here his auditor breaks in with: "A sign this disease is of wonderful cleverness, for from it Hercules, Scotus, Socrates, Callimachus and Mahomet have suffered."

They cure this malady by means of prayer, the sea-captain explains, and also "by strengthening the head, by acids, by planned gymnastics, and with fat cheese bread sprinkled with the flour of wheaten corn."

It would have been a singular ideal commonwealth in which epilepsy was the prevalent distemper. Yet most of the ancients, as well as certain aborigines, considered the falling-sickness a quasi-divine disease. It represented to them a sign that the spirit was too strong rather than too unstable. We could not follow Campanella here.

The *New Atlantis*,[26] Sir Francis Bacon's conception of an ideal commonwealth, goes farther than any other in advancing medicine to a place of paramount importance in the state. In the first edition of the book, the *New Atlantis* is followed by a list of the chief gains which Bacon anticipated from scientific discovery. These closely parallel, as we shall see, the achievements of Solomon's House. Among the discoveries were:

> The prolongation of life
> The restitution of youth in some degree
> The retardation of age
> The curing of diseases counted incurable
> The mitigation of pain
> The increasing of strength and activity
> More easy and less loathesome purgings

The inclusion of this last item, an anticlimax which approaches the ridiculous, throws considerable light on the effect of certain seventeenth-century therapeutics on the sensitive gastro-intestinal tract of a pain-scourged valetudinarian. For when Bacon wrote the *New Atlantis*, in 1623 or 1624, he was above sixty years of age and in feeble health. An easy purge might have seemed a desideratum infinitely more welcome to Bacon than, for example, to Sir Thomas More who conceived his Utopia in the full flush of vigorous manhood.

[26] The *New Atlantis* was first published in 1626. My quotations are taken from Goitein's edition (see note 13), and Bacon followed by page number will refer to this text.

The essential characteristic of the *New Atlantis* was the existence of Solomon's House, a glorified and glorious research institute devoted to the service of man rather than of the state. The theoretic end of Solomon's House was "the knowledge of causes"—pure disinterested science which aimed, not at any immediate or material benefit to mankind, but at the widening, deepening and unifying of knowledge. But the actual result of these researches, it will appear, was distinctly utilitarian; almost every experiment performed by the savants of Solomon's House bore an obvious relation to the needs or pleasures of man. And to the elderly and ailing Bacon, medicine was the most utilitarian of all the sciences and arts.

Among Bacon's numerous writings, the *New Atlantis* is the only work of fiction, and affords one of the best examples of his noble and sonorous style, his rich imagination, and his high thoughts. The fable begins with all the directness of a tale of adventure:

> We sailed from Peru, where we had continued by the space of one whole year, for China and Japan, by the South Sea, taking with us victuals for twelve months; and had good winds from the east, though soft and weak, for five months space and more.

But the breeze grew afterwards contrary, and the ship was carried north and farther north in a great storm, while the crew gave themselves up for lost. But it came to pass that they saw land, and with God's aid dropped anchor in the harbor of a fair city of the island of Bensalem, the New Atlantis.

After some space of time, the chief men of the company were shown the sights of Bensalem, and the narrator of the tale was even admitted to private conference with the father of Solomon's House. This illustrious personage outlines, first, the aim of the foundation; then, the preparations and instruments for carrying out the work; the several employments and functions to which the fellows are assigned; and the rites and ordinances which were observed.

"The end of our foundation," he explains, "is the knowledge of causes and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible." [27]

Among the preparations and instruments, the only ones with which

[27] Bacon, p. 240.

we shall concern ourselves are those with a medical end. Thus, the father of Solomon's House describes large and deep caves of several depths;[28] artificial wells, fountains and health-giving waters;[29] air-conditioned chambers and various baths and mineral waters[30]—all for the preservation of health, the cure of disease and the prolongation of life.

We have also parks, and enclosures of all sorts, of beasts and birds; which we use not only for view or rareness, but likewise for dissections and trials, that thereby we may take light what may be wrought upon the body of man. Wherein we find many strange effects: as continuing life in them, though divers parts, which you account vital, be perished and taken forth; resuscitating of some that seem dead in appearance, and the like. We try also all poisons and other medicines upon them, as well of chirurgery as physic.[31]

Here Bacon has very accurately predicted our present methods of experimental surgery and replacement therapy; and in the passage below we see an equally prophetic glimpse of our modern progress in the synthesis of drugs:

We have dispensatories or shops of medicines; wherein you may easily think, if we have such variety of plants and living creatures more than you have in Europe (for we know what you have), the simples, drugs and ingredients of medicines must likewise be in so much the greater variety. We have them likewise of divers ages and long fermentations. And for their preparations, we have not only all manner of exquisite distillations, and separations, and especially by gentle heats and percolations through divers strainers, yea, and substances; but also exact forms of compositions, whereby they incorporate almost as they were natural simples.[32]

So much for the therapeutics of Bensalem, the results of the research of Solomon's House. The fellows of this establishment, who have performed these miracles, fall unto several categories: *merchants of light,* who travel into foreign lands in search of secrets; *depredators,* who collect experiments from books; *mystery-men,* who perform the experiments of others; and *pioneers* or miners who try such new experiments as they may think good. Then there are *compilers,* who tabulate the data obtained by the mystery-men, depredators and pioneers; and *dowry-men* or benefactors who examine the

[28] Bacon, p. 240.
[29] Bacon, p. 241-2.
[30] Bacon, p. 242.
[31] Bacon, p. 243.
[32] Bacon, p. 245.

experiments for ways in which they might be turned to the use of man. There is also a sort of executive committee made up of men called *lamps,* who design new experiments to shed light on obscure problems; and *inoculators,* who perform these experiments. Finally, there are three " that raise the former discovers by experiments into greater observations, axioms, and aphorisms." These are called *interpreters of Nature.*[83]

The New Atlantis was meant to be a scientific paradise. It differed from the ideal states of Bacon's predecessors in that the fullest emphasis was placed on science. Bacon was not overly concerned with the political and social structure of Bensalem. He had no sympathy with the revolutionary communistic principles of Plato, More and Campanella, and favored a benevolent monarchy in which private property and class distinctions occupied a significant place. On the whole he had little patience, he intimates in *The Advancement of Learning,* with philosophers who " make imaginary laws for imaginary commonwealths, [for] their discourses are as the stars, which give little light because they are so high."

It has been said that all Utopias are impracticable because they take into account everything but human nature. Even the *New Atlantis* founders on this rock. As Doctor S. R. Gardiner remarked: " If Bacon had been allowed to carry out his scheme, it would probably have been found out that officialism would have smothered scientific inquiry."

Mr. Sinclair Lewis' *Arrowsmith* contains a very pertinent fictional illustration of just this point. Theoretically Mr. Lewis' " McGurk Institute " was, like Solomon's House, a temple of scientific collaboration, but being staffed by human frailty, it turned out in actual practice quite otherwise. Thus, after his experience with officialism and institute politics, Arrowsmith

> . . . had a vision of a world of little scientists, each busy in a roofless cell. Perched on a cloud, watching them, was the divine Tubbs [the father of Solomon McGurk's House], a glory of whiskers, ready to blast any of the little men who stopped being earnest and wasted time on speculation about anything which he had not assigned to them.[84]

[83] Bacon, p. 249-51.

[84] Sinclair Lewis: *Arrowsmith,* New York [1925]. Mr. Lewis' scientific collaborator was Dr. Paul H. DeKruif, who was probably responsible for the McGurk Institute.

Most of us are men before we are citizens and men before we are scientists. That is why Plato and Bacon both fail.

If human nature was banished from the commonwealths we have so far considered, the excesses of humanity and the follies of civilized life have called forth, on their own account, satirical commentaries likewise clothed in the garments of Never-Never Land. A brief view of these will lend us a perspective which sober political and scientific treatises cannot by themselves furnish.

Aristophanes in the *Birds*,[85] an extravaganza pure and simple, built a new city between earth and heaven which he called Nephelococcygia or Cloud-cuckoo-town. Since there were no immigration laws, various quacks and charlatans, each with a special scheme for improving things, arrive from Earth, and are one after another exposed and deported. Some years later, in fact not long after Plato's *Republic* had been written, Aristophanes produced a broad and amusing satire upon the very sort of ideal commonwealth of which the *Republic* was an example. This was the *Ecclesiazusae* or *Women in Council*,[86] in which the women of Athens usurp the leadership of the state and propose that all property and women be henceforth held in common. There is much of the body but little of physic in Aristophanes, and *Women in Council* is no exception. But the fact that Aristophanes drew so little blood from the Athenian physicians is a sign that there were unusually few points of entrance for his lancet. Medical satire is unfailing in its appeal to the crowd, as the dramatic writers of succeeding centuries have invariably shown.

Gargantua and Pantagruel, too, is a Utopian romance, though it is a far cry from Rabelais' " Fay ce que vouldras " to some of the oddly inhuman and unhuman laws we have examined, and it would be no service to Maître François to analyze the five books from this point of view. If there were ever a paradise of human nature, it is in the pages of this great work. Perhaps it might be required reading for all future architects of ideal states.

In 1607 the witty Bishop of Norwich, Joseph Hall, published his *Mundus alter et idem*, an account of a topsy-turvy world in which vices and virtues unblushingly usurp one another's place. Here, in

[85] The *Birds* was produced in 414 B. C.
[86] The *Ecclesiazusae* was produced in 392 B. C.

the land of Crapula or Inebriate Excess, the gravest senators are chosen, not for prudence or wisdom or even the length of their beards, but for the circumference of their bellies. And all physicians who prescribe a course of diet to any person are exiled to an isle of punishment. "There is a public college, or hospital, whither they are sent who have got the dropsy, gout, or asthma, by their eating and drinking; and here they are nourished at the public expense." [37] Shades of Plato's Republic!

Half a century after Bishop Hall's satire, was posthumously published *Les Estats et Empires de la Lune et du Soleil* by the French soldier and poet, Savinien de Cyrano de Bergerac.[38] These imaginary voyages to the moon and sun poked fun at the follies of the everyday world, and sometimes at those of ideal worlds as well. Cyrano's method of conveying himself to the moon is familiar to all readers of Rostand's play. After many ingenious but unsuccessful attempts, he finally bathed himself in the sea, and the full moon, attracting the sea-water in his hair as it does the tides, insensibly drew him upward and deposited him in the lunar world.

Once arrived there it is not long before Cyrano discovers how physic is practised in the moon. "Know then," he is told:

> that although health is regulated more carelessly in your world, the regime in this is not to be scorned. In every house there is a Physionome supported by the state who is approximately what would be called with you a doctor, except that he only treats healthy people and that he decides upon the different methods of treating us from the proportion, shape and symmetry of our limbs, from the features of the face, the colour of the flesh, the delicacy of the skin, the agility of the whole body, the sound of the voice, the complexion, the strength and hardness of the hair.[39]

The inhabitants of the moon, like those of the Aristophanic Olympus, were spiritual creatures who lived only on the steams arising from cooked foods. The function of the physionome was

[37] At the beginning of the eighteenth century Dr. William King translated a part of Bishop Hall's satire. See Andrews' edition of *Ideal Empires and Republics*, 1901.

[38] The *Voyage to the Moon* was written as early as 1648; the *Voyage to the Sun* was begun about 1650 and left unfinished at Cyrano's death in 1655. First editions, 1657(?) and 1662 respectively. I have used R. Aldington's translation, London [1923] (Broadway Translations), and page numbers refer to this edition.

[39] Cyrano, p. 130-1.

to vary the fumes of his patient's dinner according to his physical appearance. This was all very well for the lunar creatures, but hardly suited to the demands of Cyrano's terrestrial gastro-intestinal organization. For the rest, the maladies which arose in spite of the ethereal food of the lunatics were combatted by the power of the imagination:

> . . . because there is a certain natural balsam extended through our bodies containing all the qualities contrary to those of every disease that attacks us. Our imagination is warned by the pain and seeks in its place the specific remedy to oppose the venom, and so cures us. For this reason the ablest doctor in our world advises a patient rather to take an ignorant doctor whom he thinks very skilful than to take a very skilful doctor whom he thinks ignorant, because he believes that our imagination works for our health and when only slightly aided by remedies is capable of curing us, but that the most powerful remedies are too weak when not applied by the imagination![40]

This satirical observation is pointed at seventeenth-century France and Plato's *Republic;* but of course it is a true and trenchant comment on human nature as well.

The physicians of the world of the Sun were called upon to perform a singular duty. In that country:

> . . . the boys at the age of sixteen enter the novitiate of Love; this is a most sumptuous palace which covers nearly a quarter of the city. As for the girls, they enter it at thirteen. There they spend a year of probation, during which the boys are only occupied in deserving the affection of the girls and the girls in making themselves worthy of the friendship of the boys. At the end of twelve months the Faculty of Medicine visits this Seminary of Lovers in a body; they examine them all one after another, down to the most secret parts of their persons, and cause them to couple before their eyes; and then in proportion as the male is found by experiment to be vigorous and suitable, he is given as his wives ten, twenty, thirty or forty girls among those who affect him, provided the affection be reciprocal.[41]

Now this is a joke aimed directly at the *Utopia.* The Utopians were strictly monogamous, but Sir Thomas More wisely perceived that this was all the more reason why imperfections of the body should be as fully considered before marriage as were imperfections

[40] Cyrano, p. 155. [41] Cyrano, p. 306.

of the mind. So the Utopians observed a custom which was the cause of much indignation on the part of More's unthinking contemporaries, and much merriment on the part of his irreverent successors. In Utopia " a sad and honest matron showeth the woman, be she maid or widow, naked to the wooer. And likewise a sage and discreet man exhibiteth the wooer naked to the woman." [42] For, argues More, we do not buy a colt without seeing it stripped of saddle and harness; and how much more important is the irrevocable choice of a wife.

Bacon in the *New Atlantis* alludes in only one place to Sir Thomas More's *Utopia*:

> I have read in a book of one of your men of a feigned commonwealth, where the married couple are permitted before they contract to see one another naked. This [the inhabitants of Bensalem] dislike, for they think it a scorn to give a refusal after so familiar knowledge; but because of many hidden defects in men and women's bodies they have a more civil way; for they have near every town a couple of pools (which they call Adam and Eve's pools), where it is permitted to one of the friends of the man, and another of the friends of the woman, to see them severally bathe naked.[43]

I do not object to Bacon's niceness, though I much prefer the franker system of one of his contemporaries, the Elizabethan dramatist Thomas Heywood, whose song may have been inspired by the original Utopian custom:

> *Pompie* I will shew thee, the way to know
> A daintie dapper wench.
> First see her all bare, let her skin be rare
> And be toucht with no part of the French.[44]

Here Heywood was a better medical prophet than either Bacon or More; for today, at least in some states, we have the compulsory Wassermann.

One hundred and fifty years after the *Utopia*, Anthony à Wood wrote: " In his youth [Sir Thomas More] had freer thoughts of Things, as appears in his *Utopia*, . . . but afterwards he became

[42] More, p. 142-3 (see note 13).
[43] Bacon, p. 236 (see note 13).
[44] *The Rape of Lucrece*, London, 1608. Act II, scene 5 (*Valerius*).

superstitiously devoted to the Interests and Passions of the Popish Clergy." [45] Had More written his *Utopia* at this later stage, it is possible that the young men and women of that state would have courted each other, according to the Popish custom, fully clothed.

But perhaps not. There is a story which John Aubrey had on impressive authority which is too good not to be apocryphal. This delightful gossip recalls that in More's *Utopia*:

> . . . his lawe is that the young people are to see each other starck naked before marriage. Sir William Roper . . . came one morning, pretty early, to my lord [More], with a proposall to marry one of his daughters. My lord's daughters were then both together abed in a truckle-bed in their father's chamber asleep. He carries Sir William into the chamber and takes the Sheete by the corner and suddenly whippes it off. They lay on their Backs, and their smocks as high as their arm pitts. This awakened them, and immediately they turned on their Bellies. Quoth Roper, I have seen both sides, and so gave a patt on her buttock, he made choice of, saying, Thou are mine. Here was all the trouble of the Wooeing.[46]

I shall conclude this study of physicians in Utopia with an account of the ideal state which the great and misanthropic Dean Swift, in disgust with human kind, found in the land of the Houyhnhnms.[47] These noble beasts were strangers to all the vile passions of man, and hence to their unpleasant effects on the organism. Without disease, they were without physicians; nor, indeed, could they readily comprehend Gulliver's account of the medical art:

> I was going to tell [one of the Houyhnhnms] of another sort of People, who get their Livelihood by attending the Sick, having upon some Occasions informed his Honour that many of my Crew had died of Diseases. But here it was with the utmost Difficulty that I brought him to apprehend what I meant. He could easily conceive, that a *Houyhnhnm* grew weak and heavy a few Days before his death, or by some Accident might hurt a Limb.[48] But

[45] *Athenae Oxonienses*, ed. 2, London, 1721, vol. I, col. 37.

[46] *The Scandal and Credulity of John Aubrey*, edited by J. Collier. New York, 1931, p. 1-2. Other editions of Aubrey's Lives either omit or expurgate this story.

[47] *Travels into Several Remote Nations of the World.* By Captain Lemuel Gulliver. London, 1726. Part IV, "A voyage to the Houyhnhnms."

[48] Like Plato, the Houyhnhnms apparently did not disdain medicine for "wounds and epidemical distempers," for Gulliver later (ch. 9) mentions that they had "excellent Medicines composed of Herbs, to cure accidental Bruises and Cuts in the Pastern or Frog of the Foot by sharp Stones, as well as other Maims and Hurts in the several Parts of the Body."

that Nature, who works all things to Perfection, should suffer any Pains to breed in our Bodies, he thought it impossible, and desired to know the reasons of so unaccountable an Evil.[49]

I told him [explains Gulliver], . . . that it would be endless to give him a Catalogue of all Diseases incident to human Bodies; for they could not be fewer than five or six hundred, spread over every Limb, and Joynt; in short, every Part, external and intestine, having Diseases appropriated to them. To remedy which, there was a sort of People bred up among us, in the Profession of Pretense of curing the Sick.

But if the ruling race of horses had no need of physicians, the Yahoos, like the humans, could have found use for a College of them. Gulliver observed " that the *Yahoos* were the only Animals in this Country subject to any diseases. . . . Neither has their language any more than a general Appellation for those Maladies, which is borrowed from the Name of the Beast, and called *Hnea-Yahoo* or the *Yahoo's-Evil,* and the Cure prescribed is a Mixture of *their own Dung* and *Urine* forcibly put down the *Yahoo's* Throat." [50]

The medical parallel between Yahoos and humans is explicitly drawn. The nauseous ingredients of the Yahoo's specific are matched by an account of European physicians who " from Herbs, Minerals, Gums, Oyls, Shells, Salts, Juices, Seaweed, Excrements, Barks of Trees, Serpents, Toads, Frogs, Spiders, dead Mens Flesh and Bones, Beasts and Fishes, form a composition for Smell and Taste the most abominable, nauseous, and detestable, they can possibly contrive, which the Stomach immediately rejects with loathing; and this they call a Vomit." [49]

Plato, we recall, castigated " the skilful sons of Aesculapius [who] invent new names to diseases," and we find Swift brandishing the same cudgel. " Besides real Diseases," he says, " we are subject to many that are only imaginary, for which the Physicians have invented imaginary Cures; these have their several Names, and so have the Drugs that are proper for them." [49]

Swift once wrote a famous letter to Pope in which he said: " I have ever hated all nations, professions, and communities, and all my love is towards individuals; for instance, I hate the tribe of lawyers, but I love Counsellor Such-a-One, and Judge Such-a-One." We

[49] *Ibid.*, ch. 6.
[50] *Ibid.*, ch. 7.

know his opinion of physicians in general, but he dearly loved Doctor Arbuthnot in particular. And which indeed is better, asks Mr. Charles Whibley: "To love John, Peter, and Thomas with a constant heart, or feigning a bland and general love of abstract humanity, to wreak a wild revenge upon individuals. We know well enough whither universal philanthropy leads us." [51]

The great Dean ends his account of eighteenth-century medicine with a bit of satire I have been able to trace down twenty-five centuries. It was funny, and sometimes true, when the Greek comic writers used it; and it is still funny and perhaps sometimes true when we hear it today over the radio. The great excellency of the tribe of physicians, says Swift at his most ironical:

> is their Skill at Prognostics, wherein they seldom fail; their Predictions in real Diseases, when they rise to any Degree of Malignancy, generally portending Death, which is always in their Power when Recovery is not: And therefore, upon any unexpected Signs of Amendment, after they have pronounced their Sentence, rather than be accused of false Prophets, they know how to approve their Sagacity to the World by a seasonable Dose.[49]

But this is no longer Medicine in Utopia: it is perilously close to medicine in real life.

Although most of the ideal commonwealths are largely political in nature, this essay points a political moral only by implication. We have seen, in our survey of past Utopias, that the progress of the medical art was independent of the theorizing of Utopians concerning the function and value of physicians. The physicians kept this independence because their art remained humanistic and not political or economic. And if the medical profession continues to keep to the traditional path, it cannot help but continue independent of political changes, either actual or hypothetical. It is self-evident that the physician, as a citizen of his state, is entitled to any political views he may desire to hold; but I do not believe that the medical profession, as a keeper of a divine tradition, has any business in politics. If we train our future physicians to follow in the footsteps of the great physicians—Hippocrates, Paré, Sydenham, Osler—we shall never need concern ourselves about the relation between Medicine and the State.

[51] *Literary Studies.* London, 1919, p. 345.

Paré was a Huguenot in the midst of the madness of the St. Bartholomew's Day massacre; Sydenham was an unreconstructed Roundhead in the heyday of Royalist reaction; yet each, in his character of Physician was apart, indeed above, the passions of the day. Thus, a Utopian relation between Medicine and Humanity exists, not because of, but, rather, independently of legislative law.

Fig. 1.

UNIV. OF MICH.

ANDRES A LAGUNA, A PIONEER IN HIS VIEWS ON WITCHCRAFT

HARRY FRIEDENWALD

Andres a Laguna, commonly called Lacuna in Latin literature, was born in Segovia in 1499.

His father was a physician named Jacob Fernando a Laguna, who was given the title of nobility in 1480, because of special merit. Nothing definite is known concerning his ancestors on his father's side. It is surmised that the family name is derived from the old Roman town Numancia, in Castilian Lugano. His most extensive biography states that the family was Castilian of illustrious lineage but no facts are given as a basis for this statement.[1] His mother was of the Velasques family. After receiving his early education in Segovia, Andres studied at the University of Salamanca, and later, in Paris, where he devoted himself to the Greek language and to medicine and where he wrote his earliest works. He returned to Spain in 1536, was given the degree of Doctor of Medicine in Toledo in 1539. In the same year he became a court physician and accompanied the king on his campaign to Flanders. He then took up his residence in Metz, where he remained for a number of years. In 1542 he went for several months to Cologne, where he joined the university circles and was busily occupied with historical writing; and here he gave an oration before a distinguished body on the unhappy state of Europe. In 1545 he accompanied the Emperor to Rome and spent the next twelve years as physician to Popes Paul III and Julius III; he lived for a period at the ancient home of Cicero, where he wrote the life of Galen. During his Italian stay he became associated with the University in Bologna and was made a Count

[1] *Estudio Historico de la Vida y Escritos del sabio Espanol Andres Laguna* por Joaquin Olmedilla y Puig, Madrid, 1887.

The chief sources used by the writer are:

Nicolas Antonio, *Bibliotheca Hispana Nova, Madrid,* 1783-88, pp. 75-78.—Marini, *Degli Archiatri Pontifici,* Rome, 1784, vol. I, pp. 412-14.—Jourdan, *Dictionaire des Sciences Médicales,* Biogr. Médicale, Paris, 1822, vol. V, p. 48.—Bayle & Thillaye, *Biographie Médicale,* Paris, 1855, vol. I, p. 194.—Pagel, in Hirsch, *Biogr. Lexikon,* 1886, vol. III, p. 587.—Lemos, *Amato Lusitano,* Porto, 1907, pp. 25-29.

Palatine. After the death of Pope Julius in 1555, Laguna went to Antwerp for a time, but returned to Segovia in 1557. Excepting a short journey to France he remained in Segovia; here he died in 1563. Laguna was a very devoted physician not only to kings and popes but equally to the people; in Metz during a frightful epidemic of plague in 1542, he served with devotion. Laguna was a very prolific writer.[2] Special mention, however, must be made of his Commentary on Galen (1548, 1553), his Epitome of Galen (1551, 1553, 1571, 1604), his treatise on anatomy and dissection (1535), and his works on materia medica (1554, 1555). But he was also deeply interested in public affairs and showed his devotion to the Church by his efforts during the struggles in the Protestant revolution.

The writer's interest in Laguna was awakened by the numerous references to him in Amatus' works. Laguna was a fellow student of Amatus and Amatus rarely mentions him without terms of admiration for his learning,[3] calling him "a second Galen" of Spain.[4]

Although one looks in vain for any mention of Laguna's name in the *Encyclopedia Britannica* or in such recent works on medical history as Garrison[5] or Castiglioni, the earlier handbooks such as Sprengel,[6] Haeser,[7] Neuburger & Pagel,[8] make numerous references to his contributions to the medical progress of the 16th century.

The high regard in which he was held by his countrymen was shown in 1869 when the project of a National Pantheon was planned. His ashes were taken to Madrid and borne to church with

[2] The fullest bibliographic lists are found in Nicolas Antonio's, Jourdan's and in Bayle & Thillaye's works, mentioned above.

[3] He speaks of him as "his learned fellow student" (Centuria I, Curatio 3), as "a most learned man" (Dioscorides, Enarratio 1, and 95), "with a great name in the field of medicine" (Centuria IV, Curatio 19), who published "a most admirable epitome of Galen" (Dioscorides, Enarratio 90, 91).

[4] Centuria IV, Curatio 19.

[5] In his "Epitome of the History of Spanish Medicine," *Bulletin of the N. Y. Academy of Medicine*, August 1931, he has a paragraph on Laguna (p. 607).

[6] *Pragmat. Geschichte der Arzneykunde*, Halle, 1827, Part III, pp. 50, 105, 575.

[7] *Lehrbuch der Geschichte der Medizin*, Jena, 1881, Vol. II, pp. 137, 193.

[8] *Handbuch der Geschichte der Medizin*, Jena, 1903, vol. II, pp. 18, 21, 211, 567, 570, 706.

great pomp and ceremony. But the most enduring testimony of his fame is that of Cervantes:[9] "Nevertheless," said Don Quixote, "at this time I would rather have a slice of bread and a couple of heads of salt pilchards than all the herbs described by Dioscorides, though commented upon by Doctor Laguna himself."

Having become interested in Laguna, it was with great surprise that I read of his views on witchcraft and the extraordinary evidence he presents. I found it unexpectedly cited in a non-medical book.[10]

The citation there given was so colorful and extraordinary that I sought the original account. The title of the work given in the reference was indefinite and it was only through the kindness and help of Colonel H. W. Jones and Dr. Mayer, of the Army Medical Library (to both of whom I am deeply grateful), that the original account was found in the work indexed as: "Dioscorides: Pedacio Dioscorides Anazarbio, acerca de la materia medicinal, etc. (Spanish translation with annotations of Andres de Laguna), New edition Salamanca 1566." The account is in the section entitled Solano, p. 421. The book is so difficult to obtain that the translation of the account is here given in its entirety:[11]

> "Dioscorides says that if a dram of the root of night-shade (carrier of madness) is drunk with wine there will be produced certain vain fantasmagorias which are at the same time very agreeable: it is to be understood that these visions are produced during sleep. That must be too (as I believe) the virtue of some unguents with which it was customary to anoint witches; the extreme cold of these unguents induced sleep, and during this lasting and very deep sleep impressed on their minds quite tenaciously a thousand fantastical visions, so that on awakening they would confess to that which they had never

[9] Part I, Book III, Chapt. XVIII.

[10] *The History of the Jews in Spain* by Don Adolfo de Castro, Cadiz, 1847, translated by Rev. E. D. G. M. Kirwan, Fellow of Kings College, Cambridge, 1851, pp. 68, 69.

[11] I am indebted to Mr. M. L. Radoff, now State Archivist for Maryland, for the translation. It is to be noted that while the "new edition" is dated 1566, an earlier edition (cited by de Castro), appeared in Antwerp in 1555.

done. To confirm this opinion I shall tell you a story. When I was the municipal physician for the town of Metz, I visited Duke Francis of Lorraine, who was ill in Nancy in the year MDXLV. At that time there appeared before his Lordship the town council demanding justice and vengeance against two unfortunate old people, who were husband and wife and who lived in a hermit's cabin a half a league from that city, because (according to popular rumor) they were notorious wizards, burning all the new-sown land, killing all the live stock, and sucking the blood of the children, and had done terrible damage. When he had heard these serious charges, the Duke sent to arrest them and put them to the torture; they thereupon confessed all the charges, and among other frightful deeds they affirmed that they had murdered the duke's father, Duke Anthony; they also stated that they had given him, Francis, the grave malady which little by little was destroying him. The Duke asked them in what manner and form they had caused his malady. The old man said that it was because His Excellency had not washed his feet on the preceding Maundy Thursday; he had been one of the twelve poor to appear for the ceremony, as was the use and custom of the land, and he had fallen into great melancholy when the ceremony was not performed. When he saw the Devil in his circle afterward he was asked by the Devil to tell the reason for his sadness. Having heard the story, the Devil asked him whether he wished to be avenged of the Duke, and if he did to take the worm, the Devil offered him and when he saw the Duke pass by his hermitage to throw it before the hooves of his horse and this would make the horse stumble and crush the Duke. But if he did not wish to kill him, but only to have him fall sick, then to go up to him on the road as though to beg alms and then to contrive to breathe in his face; 'then,' said the Devil, 'I shall be at your back and I shall breathe on the back of his head and I shall so infect him that only you will ever be able to cure him again.' In this fashion, said the wizard, he had infected the Duke, with the intention of curing him soon after with a secret remedy which his master the Devil had taught him. And then,

although the council was resolved that both of them should be burnt, the Duke showed mercy to the old man because of the hope of a cure for his malady. Thereupon the old witch was reduced to cinders in the presence of her husband, who was given gifts by the Duke and favored by him; and the Duke spared his life, although he kept him closely watched. One day he went with his guards to eat at the place where they had accused him. He ate heartily that night and by daybreak he was dead of suffocation; the Duke died only a few days after this. The people said that the Devil had twisted the neck of the villain in order that he might not restore the Duke to health. Others believe that the peasants of that place, because of the hatred which they had for him had given him poison. But what has this story to do with night-shade? Among other things found in the hermitage of the two wizards was a pot half full of a certain green unguent like white poplar ointment with which they anointed themselves. The odor of this unguent was so heavy and oppressive that it seemed to be composed of the very coldest and soporific herbs: which are the cicuta, the night-shade, the henbane and the mandragore. The judge, who was a friend of mine, got me a good sample of this ointment with which, later in the city of Metz, I had the wife of the executioner anointed from head to foot who, because of jealousy of her husband, had completely lost the ability to sleep and who had become half insane because of it. She was a very good subject for experiment because an infinite number of other remedies had been tried in vain and it seemed to me that this was the correct one and I could not resist trying it, and because of its telltale color and odor it was easy to concoct. Now as soon as this lady had been anointed, with her eyes open like a rabbit's and appearing very much like a cooked hare, she fell into such a profound sleep that I never thought I would be able to waken her. However, by means of strong ligatures and rubbing of the extremities, [azeyte costino (?)] officinal spurge, fumes and vapors to the nose and finally by means of cupping I got along so well that at the end of thirty-six hours I restored her to her sense and her memory. The first words

that she uttered were, 'Why in an evil hour did you awaken me? I was in the midst of all the pleasures and delights of the world.' Then she turned her eyes toward her husband, and smiling all the while said to him (he was standing there gaping like a man on the gallows) 'Knave, I want you to know that I have put horns on your head and with a younger and handsomer gallant than you.' And she said many other strange things and she asked us to leave her and let her fall asleep again, from which desire we diverted her, but she ever after had some of these fanciful things in her head. From which we may conjecture that whatever witches may say or do is only a dream caused by cold drinks and unguents: the which corrupt the memory and the imagination in such a fashion that they make the timidest person imagine and firmly believe that he had done things which in truth he only dreamed while sleeping.

"We may add to the above, the not unimportant argument that, like her, all others who have practiced such infamous conduct have always confessed (as may be seen in the trials) that they have known the devil carnally on many occasions. And if they are asked whether they have enjoyed special pleasure in this they have always answered no. And the reason for this is that they feel a frigidity in the diabolical parts, from which (as it appears to them) there comes a humor as cold as ice which enters into their intestines like hail stones. These things cannot come from any other cause but the excessive cold of the unguent which pervades their whole bodies and enters the marrow. Therefore, such people as these, granted that they are scandalous and merit exemplary punishment for making pacts with the devil, utter, in truth, only vanities, for neither in spirit nor in body do they ever quit the spot where they fall overcome with sleep; and this is the opinion of the majority of the theologians supported also by the decrees of various Holy Councils. We must realize that the Devil cannot work except through natural causes, applying active [passivis](?). Therefore, because of his wisdom and shrewdness he knows the virtues of such unguents, and he teaches them to the foolish witches in order to make them dream and imagine an infinite

number of stupidities and vanities. I maintain this despite the fact that some pious gentlemen take it for granted that the devil can transform these witches into a hundred thousand phantoms and take them up into the air both in spirit and in body; and in this matter as in all the rest, I fall back on the sound opinion of the Holy Church of Rome. Opium performs this same cooling function throughout all Turkey. When it has been drunk, the sweetest dreams come on accompanied by all the well-being which can be desired, which (it seems to me) accords with all that Dioscorides has said about the night-shade." [12]

Johannes Wierus (1515-1588) has hitherto been regarded as the first valiant opponent of the age-old views of witchcraft. The purpose of this paper is to contest Wierus' priority and to claim it for Andres a Laguna. Laguna's work appeared eight years before the first appearance of Wierus' work in 1563. My friend, Dr. Chr. Deetjen [13] of Baltimore, who has spent many years in the study of the history and literature of witchcraft, informs me that the name of Laguna is not mentioned in any of the works of his extensive library.

It is worthy of special note that while Laguna is careful to avoid any church transgression he pays due deference to the works of the Devil. He states that "his patient was a good subject and he could not resist making the experiment." The experiment was very successful and it is doubtful whether it has ever been made more scientifically and convincingly. Laguna's comments and conclusions are well justified.

The "flying ointments" of the witches have been fully studied since Laguna's time. Wierus himself writes [14] of some "natural

[12] It was only after this paper had been written that I obtained the biography by Joaquin Olmedilla y Puig referred to above, and here I find the witch account given in its entirety. The use of the copy was obtained through the kindness of Harvard University Library.

[13] I am indebted and deeply grateful to Dr. Deetjen for much help in this study.

[14] The writer has been unable to discover whether Laguna and Wierus met. They were both students of medicine in Paris in 1534. It was in 1545 when the remarkable episode with the witch ointment took place in Metz that Wierus settled in the Dutch town of Arnhem. It is very likely that a physician with Wierus'

remedies with which witches are driven about, as well as by their ointments and herbs which likewise put them to sleep and disturb their spirits." He makes no mention of Laguna, but cites a case of Porta, in which an old hag went through the procedure of anointing herself, and falling asleep was observed through a crack in the door.[15]

The name Laguna is one familiar to students of Spanish Jewish history. It is found in the works of Kayserling,[16] Roth,[17] Graetz,[18] and in the publications of the Jewish Historical Society,[19] and in the *Jewish Encyclopedia*.[20] The most notable was Daniel Israel Lopez Laguna (1660-1730), a poet and martyr of the Inquisition, whom Kayserling describes as one of the greatest suffers and a living wandering Jew. The suggestion offered by these names led the writer to further investigation. Since Andres Laguna was born in Segovia and as Segovia had an old Jewish community of considerable size, a community that had suffered great persecution and even a terrible massacre in 1474, it was interesting to learn that Marranos had been numerous there since the end of the 14th century.[21]

These facts are set forth as indicating the possibility that Andres Laguna was descended from Marrano stock.

Neither his staunch devotion to the Church, nor the high favor which he enjoyed at the hand of Emperor and Pope are proof to the contrary, as is well known to all familiar with the history of Marranos in Spain. His biographer knows nothing definite about his forefathers, not even about his grandparents. But in the light of this possibility it is interesting to note that two other men of great distinction, and these of definitely Jewish descent similarly showed

interest in witches may have learned of it. His own work did not appear until 18 years later. In Murray's *Witch Cult in Western Europe*, A. J. Clark gives the composition of three "flying ointments," Oxford, 1921, Appendix, p. 279.

[15] *De Praestigiis*, German ed. 1566, p. 452.

[16] *Biblioteca, Espanola-Portugueza-Judaica*, p. 55; *Sephardim*, p. 251; 297; 300; *Geschichte der Juden in Portugal*, p. 324.

[17] *History of Marranos*, p. 330.

[18] *Geschichte der Juden*, 1868, Vol. X, p. 326.

[19] Vol. III, pp. 110, 139; Vol. IV, pp. 121, 162; Vol. V, p. 119.

[20] *Jewish Encyc.* "Laguna." Da Silva Rosa (*Juden in Amsterdam*, p. 165) tells of a recent Baruch Laguna, a Jewish artist in Amsterdam.

[21] *Jew. Encyc.* "Segovia," p. 156.

very advanced views in opposition to those current concerning witchcraft. I have elsewhere referred to Amatus (1511-68) who declined to treat one patient whose relatives were so convinced that he was under the influence of evil spirits that they called in monks to exorcise the spirits.[22] On another occasion he helped acquit a woman charged with bewitching a young man who had become deaf, by proving to the court that the man's trouble was syphilitic.[23] Amatus was a Marrano who later reverted to Judaism.[24]

Montaigne (1533-92) whose mother was a member of the Marrano family of Lopez, wrote a clear and forceful statement which is well known arraigning the belief in witchcraft.[25] According to Lecky "Montaigne appears to have been the first who openly denied" disturbances of the functions of wedlock by witchcraft. He pronounced "the statements of the witches . . . intrinsically incredible."[26]

The thought naturally arises: what influence did the tradition and the opinions of Jewish scholars have in shaping the views of Amatus and of Montaigne, perhaps of Laguna. We need but be reminded of the forceful views of Maimonides concerning the then current superstitions, in his *Moreh Nebukim*:[27]

He inveighed against those who "believed that by means of these arts they could perform wonderful things . . . although no analogy and no reasoning can discover any relation between these performances of the witches and promised result. . . . Great is the number of these stupid and mad things."

Maimonides' statement was written near the end of the 12th century, the Moreh was translated into Hebrew in 1204 and ap-

[22] Centuria I, curatio 34, published in 1551.

[23] Centuria VI, curatio 87, published in 1560.

[24] See *Bulletin of the Institute of the History of Medicine*, The Johns Hopkins University, Vol. 5, 1937, pp. 603-653.

[25] *Essay on Cripples*, Book III, chapt. XI, Navarre Society Ed. London, 1923, p. 198-201. Book III first appeared in 1588. One of the relations of the mother's family was burnt at the stake in Saragossa (Roth, *Spanish Inquisition*, London, 1937, p. 56).

[26] Lecky: *History . . . of Rationalism in Europe*, New York, 1868, Vol. I, pp. 100 and 111.

[27] "Guide for the Perplexed," translated by M. Friedlaender, London and New York, 1904, Pt. 3, chapt. 37, p. 332.

peared in Latin translation in Paris in 1520! It is one of the most important works in later Hebrew literature and has been a mine for study and discussion for many centuries.

Other great Hebrew scholars during the Middle Ages expressed equally advanced and courageous views. Isaac Abravanel (1437-1508) in his commentary on the Book of Samuel[28] discusses the question of witchcraft in reference to the Witch of Endor (Samuel I: Chap. 28). He cites Samuel ben Hofni, who died in 1034, the last Gaon of Sura, who regarded the matter as one of pure deception! Another opinion cited is that of Levi ben Gerson commonly known as Leo Hebraeus (Gersonides) (1288-1344) of Southern France; he wrote that the account was all imaginary and the result of Saul's mental disturbance. These views are in perfect accord with those of Maimonides as expressed in his Yad ha-Hazakah in the section on Idolatry.

Is it not probable that these forceful opinions in some measure account for the advanced views of those to whom they were accessible?

[28] In the "Commentary on the Early Prophets." It is to the Hebrew scholar, Dr. E. H. Golomb of the Baltimore Hebrew College that the writer feels himself indebted deeply for the information concerning the references of Abravanel.

y sentido, se dize Solanum mortale. Vltra estas quero esperar de Solano ya dichas, se halla otra muy nueva grana, la qual se estiende como la yedra, pequeñas como aquellas del Smilax, son ciertos granos redondos como guisantes muy perfectamente estampados: de donde la flaqueza de coraçon y que por entre las especies de la Morella, una pequeña

STRAMONIA.

DIOSCORIDES.

Pedacio Dioscorides Anazarbio, acerca de la materia medicinal (etc. Spanish transl. with annotations of Andres de Laguna) New ed. 6 p.l., 616p., 14 l. 4o. Salamanca, Mathias Gast, 1566.

vengarse à los ministros.

Dize Dioscorides, que bevida con vino una dragma de la raiz del Solano acarreador de locura, representa ciertas imaginationes vanas, empero muy agradables: lo qual se ha de entender entre fieles. Aquestas pues dize (segun pienso) la virtud de aquellos ungüentos, con que suelen untar las brujas: la grandissima frialdad de los quales, de tal suerte les adormesce, que por el discurso y profundissimo sueño, las imprime en el celebro tenazmente mil burlas y vanidades, de suerte que despues de despiertas confiessan lo que jamas hizieron: para confirmation de lo qual, quiero contaros aqui una historia. Siendo yo medico assalariado de la ciudad de Metz, visitè el Duque Francisco de Lorrena, que estaua alo en Nancy, el año de M. D. XLV. En la qual sazon vino alli à su Señoria todo un concejo à pedir justicia y vengança contra dos viejezuelos de sus vezinos, que eran marido y muger, y se tenian en una barraquilla, media legua de aquella villa, por quanto (segun la publicacion y fama) eran brujos notorios, y quemando las sementeras, matando todo el ganado, y sorviendo la sangre à los niños, bien en bebo delos irreparables. O yd los delitos de estos criminosos, mandò el Duque prenderlos, y meterlos a la question: los quales confessaron luego todo lo suso dicho, y mas otras muy horrendas hazañas, affirmaron que ellos havian muerto el Duque Antonio su padre, y el Diablo aquella enfermedad tan grave, que poco a poco le consumia. Preguntandoles el Duque, porque respecto, y en que forma, le havian hecho enfermar, dixo el viejo confusamente, que porque el mucho de la vara passado, su Excelentia no le havia besado los pies, y vestido entre los suyos pobres, como solia los otros años, entro en una melancolica muy grande, y despues como siempre le viesse el diablo muy triste en el cerco, entendida la causa de su tristeza, le dixo, si quieres vengarte del Duque, toma esta vara, y quando le vieres passar por tu barraca, echasela delante de los pies del caballo, y assi reventara y se hara mil pedaços. Empero si no le quieres matar, sino tenerle enfermo, sal como à pedirle limosna al camino, y procura de rassollarle en el rostro: porque estonces estando yo a tus espaldas, soplare tambien por tu colodrillo, y le inficionare cõ mi aliento de tal suerte, que ninguno sino tu, pueda jamas curarle. En este modo pues dixo el brujo barraquillo, que havia inficionado al Duque, con intention de curarle presto, con un secreto remedio que le havia enseñado su maestro el demonio. Por donde aun que el consejo se resolviesse en que fuessen quemados entrambos, toda via el Duque hizo gratia y merced de la vida al viejo, por la confiança que en el tenia de su salud, y assi la vieja fue hecha polvos en presentia de su marido: el qual despues siendo regalado y favorecido en extremo del Principe, aun que tenido siempre a muy buen recaudo, un dia con sus guardias se fue a comer al lugar de dõde le havian acusado, y haviendo hecho aquella noche muy buena cheta, y estando en gran regozijo, amanecio abogado: tres el qual myrio el Duque desde a no muchos dias. Dezianse entre los populares, que el diablo havia torcido el cuello al villano, porque no diesse salud al Principe. Otros tenian sospecha, que

Fig. 2.

los labradores de aquel lúgar, por la cubdiſia y odio, que le tenian, le hauian mezclado veneno. Empero que tiene que hazer eſte cuento, con el Solano? Entre otras coſas que ſe hallaron en la hermita de aquellos brujos, fue vna olla medio llena de vn cierto vnguento verde, como el del Popaleon con el qual ſe vntauan: cuyo olor era tan graue y peſado, que moſtraua ſer compueſto de yernas en vltimo grado frias y ſoporiferas: quales ſon la Cicuta, el Solano, el Velello, y la Mandragora: del qual vnguento, por medio del alguazil, que me era amigo, procure de hauer vn buen botezon que deſpues en la ciudad de Metz bize vntar de pies a cabeça la muger del Verdugo, que de celos de ſu marido hauia totalmẽte perdido el ſueño, y buelto ſe quaſi mẽtes phrenetica: y eſto, aſſi por ſer el tal ſubjecto muy apto, en quien ſe podian hazer ſemejantes pruebas: como por hauer prouado infinitos otros remedios en balde, y parecerme que aquel era mucho a propoſito, y no podia dexar de la aprouechar, ſegun de ſu olor y color facilmente ſe colegia. La qual ſubito en ſiendo vntada, con los ojos abiertos como conejo, parecziendo tambien ella propriamente vna liebre cozida, ſe adormio de vn tan profundo ſueño, que jamas penſe deſpertaria. Por donde con fuertes ligaduras y friſtiones de las extremidades, con perfuſiones de azeyte coſtino, y de euphorbio, con ſahumerios y humo à narizes, y finalmente con ventoſas, la di tal prieſſa, que el cabo de x x x vj. horas la reſtituy en ſu juyzio y acuerdo: con q̃ la primera palabra que hablò, fue: Por que en mal punto me deſperteſtes, que eſtaua rodeada de todos los plazeres y delytes del mundo, y bueltos á ſu marido los ojos, (el qual eſtaua alli todo bediendo à abracadas) dixole ſonriendoſe, Tocallo hagote ſaber que te he pueſto el vntorno, y con vn galan mas moço y mas eſtirado que tuzy dexiõ otras coſas muchas, y muy eſtrañas, ſe dexauan porque de alli nos fueſſemos, y la dexaſſemos bolar à ſu dulce ſueño, del qual poco à poco la diertimos, aun que ſiempre la quedaron ciertas opiniones vanas en la cabeça. De donde podemos conjecturar, que todo quanto dizen y hazen las deſuenturadas brujas, es ſueño, cauſado de benenges y vntiones muy frias: las quales de tal ſuerte las corrompen la memoria, y la phantaſia, que ſe imaginan las cuytadillas, y aun firmiſſimamente creen, hauer hecho deſpertas, todo quanto ſoliaron durmiendo.

Allegaſe à todo lo ſuſodicho, vn no liuiano argumento: y es, que aſſi aquellas, como todas las que en tan infames exercitios fueron halla aqui conuencidas, à vna boz confeſſaron (ſegun conſta por ſus proceſſos) que hauian enojado muchas vezes carualmente al Demonio: y preguntadas en particular, ſi hauian ſentido notable deleyte en ſu accẽſſo, reſpondieron conſtantemente que no: y eſto à cauſa de la intemportable friedad que ſentia en las partes diabolicas: de las quales tambien, à ſu parecer, ſe les retuerta en humor frio como el yelo, y à manera de granizo, por las entrañas. Los quales accidentes no pueden proceder de otra cauſa, ſino de la exceſſiua friedad del vnguento, que las traſpaſſa todas, y ſe les mete en los tuetanos. Aſſi que las tales, dado que ſean eſcarmentadoſas, y merezcan vn caſtigo exemplar, por hazer pactos con el Demonio, toda via la mayor parte de quanto dizen, es deſuario: pues ni con el eſpiritu, ni con el cuerpo, jamas ſe aparten del lugar adõde caen agranadas del ſueño: y eſta es la opinion de la mayor parte de los Theologos, aprouada tambien con decretos de algunos ſanctos Concilios: conuiene a ſaber, que el Demonio no puede obrar ſino por medio de naturales cauſas, aplicando eficaz paſſiuas: que aſſi por ſu demaſiado ſaber y agudeza, conociendo la virtud de los ſemejantes vnguẽtos, ſe los enſeña a las vanas brujas, para hazerlas ſoñar y creer infinitas burlas y vanidades: no obſtante que algunos Varones Pios, tienen por reſolato, que el Demonio las puede tranſformar en ciẽt mil phantaſmas, y llenar las en cuerpo y en anima por el ayre: en lo qual, aſſi como en todo el reſto, me remito al ſano parecer de la Sancta igleſia de Roma. Tiemplaſe tambien por toda la Turquia de tal ſuerte el opio, que beuido acerca ſuaues dulciſſimos, y acompañados de toda la felicidad que deſſear ſe puede: lo qual (ſegun parece) conforma con lo que del Solano recita Dioſcorides.

Del Dorycnio. Cap. LXXVI.

*Eſt cod. mutilum, nonnullaque dñi, ꝛc. ſuppleta, ſi quiere de ti, mas lúgas y mas angoſtas.

EL Dorycnio llamado Halicacabo, ò Cales, de Crateuas, es vna mata ſemejante al oliuo reziẽ nacido. Produze los tallos menores de vn codo, y nace en las piedras no lexos del mar. Sus hojas en la color ſe parecen à las del oliuo, aun que ſon *menores, mas robuſtas* y aſperas en extremo. Haze las flores blacas, y encima de los tallos vnos hollejos como aquellos de los garuanços, redondos, y eſpeſſos: dentro de los quales ſe encierran cinco, ò ſeys granos menudos, liſos, rezios de color varios, y tamanos como yeruos pequeños. Su rayz es grueſſa de vn dedo, y de longura de vn codo. Eſta planta, ſegun parece, prouoca ſueño: y tomada en gran quantidad: deſpacha. Dizen algunos que ſu ſimiente ſe da para bien querer.

NOMBRES ANNOTATION.

Griego, Δορύκνιον. Lat. Dorycnium.

TIenen el Dorycnio algunos por vna eſpecie del Solano furioſo. Empero en nueſtros tiempos no ſe alcança qual planta ſea. Llamoſe aſſi, porque antiguamente con ſu çumo ſe vntauan los barros de las ſaetas y lanças.

De la Mandragora. Cap. LXXVII.

DE la Mandragora llamada de vnos Antimalo, y de otros Circea, porque ſu rayz parece vtil à los hechizos, ſe hallan dos differentias: conuiene à ſaber, vna negra, la qual es la Hembra, y

LIOTOT AND JALOT, TWO FRENCH SURGEONS OF EARLY TEXAS *

PAT IRELAND NIXON
San Antonio, Texas.

Disaster and disease, so often the twin spectres of destiny in the explorer's life, were directly accountable for the failure of La Salle in his third attempt to explore the mouth of the Mississippi River and for the ultimate extinction of his colony on the coast of Texas. Chevalier Robert de la Salle—a man of iron if there ever was one—set sail from France in July 1684 in four ships with 300 persons on board. Two months later they touched at Santo Domingo and this stop is possibly significant in their later medical story. Father Le Clercq records that " the soldiers and most of the crew, having plunged into every kind of debauchery and intemperance, so common in those parts, were so ruined and contracted such dangerous disorders that some died in the island, and others never recovered." [1]

On February 20, 1685, they entered Matagorda Bay, far from their desired destination. Dissension and disease and death were with them on shipboard and they were with them as they landed. " On shore," says the engineer Minet, " they were all sick with nausea and dysentery. Five or six died every day, in consequence of brackish water and bad food." [2] The withering havoc of starvation and disease followed this ill-fated colony. Parkman relates that " under the sheds and hovels that shielded them from the sun lay a score of wretches slowly wasting away with the diseases contracted at St. Domingo." [3] Marquis de la Sablonniere seemed to have paid an excessively severe price for his debauchery at Santo Domingo, because it is recorded that " he had squandered the little that be-

* Read before the State Historical Association of Texas, April 29, 1939.

[1] Le Clercq, Father Christian, *Account of La Salle's Attempt to Reach the Mississippi by Sea and of the Establishment of a French Colony in St. Louis Bay,* Paris, 1691. In French's *Historical Collections of Louisiana,* New York, 1852, Part IV, p. 189.

[2] Parkman, Francis, *La Salle and the Discovery of the Great West,* Boston, 1879, p. 383.

[3] *Ibid.,* p. 393.

longed to him at St. Domingo, in amusements *indignes de sa Naissance*, and in consequence was suffering from diseases which disabled him from walking." [4] Le Clercq states that, about one month after landing and about four months after leaving Santo Domingo, "the maladies which the soldiers had contracted at St. Domingo were visibly carrying them off, and a hundred died in a few days, notwithstanding all the relief afforded by broths, preserves, treacle and wine, which were given them." [5]

Recalling how prevalent syphilis was in Haiti and how the disease had been carried back to Europe by Columbus's men, it is not difficult to speculate that possibly "the diseases contracted at St. Domingo" were syphilitic in nature. Joutel registers an opinion of the city which might be similarly interpreted: "The air of this place is bad; so are the fruits; and there are plenty of women worse than either." [6]

La Salle was sick along with his men. Joutel records that at one time he fell dangerously ill with a "violent Fever, attended with Lightheadedness which brought him almost to Extremity." [7] And in the summer of 1686, according to Father Douay, he was stricken with a prolonged fever with frequent relapses, suggestive of typhoid fever.[8] But he had the added handicap of a hernia which would have discouraged a less determined man. This hernia troubled him from time to time and on one occasion, from partial strangulation or some other complication, he was disabled for a period of four or five weeks. The operation of herniotomy was in vogue at the time and the wonder is that La Salle, knowing the physical hardships to which he would be subjected, did not submit to the operation, or at least that he did not consult his truss-maker before leaving Paris.

La Salle possessed courage, resourcefulness, perserverance and other qualities of leadership. One thing, however, he seemed to lack, at least on the voyage which resulted so disastrously at Ft. St.

[4] *Ibid.*, p. 418.
[5] Le Clercq, *op. cit.*, p. 193.
[6] Parkman, *op. cit.*, p. 372.
[7] Joutel, Henri, *Journal of La Salle's Last Voyage, 1684-7*, Albany, 1906, p. 60.
[8] Douay, Father Anastasius, *Narrative of La Salle's Attempt to Ascend the Mississippi in 1687*. In French's *Historical Collections of Louisiana*, New York, 1852, Part IV, p. 206.

Louis in Victoria County in 1687, and that was ability to choose his personnel. Many of his men were recruited from the scum of France; vagabonds of the world, pirates of the sea they were who, as soon as they were out of sight of the shores of France, became a source of unrest and violence. And when they reached Texas, where discipline was difficult, dissensions and disaffections arose with tragedy and death as their sequels. Of this group was surgeon Liotot, who had a big financial investment in the expedition. On shipboard and well into the wilderness of Texas, Liotot and one other surgeon whose name is not mentioned fulfilled their duties, for the most part, without comment or commendation. The first mention of surgeon Liotot's work was in April, 1685, when he performed the first recorded leg amputation in Texas. Joutel gives this firsthand description of this pioneer operation: "About that Time, and on Easter-day that Year, an unfortunate Accident befel Monsieur le Gros. After Divine Service he took a Gun to go kill Snipes about the Fort. He shot one, which fell into a Marsh; he took off his Shoes and Stockings to fetch it out, and returning, through Carelessness trod upon a Rattle Snake, so call'd, because it has a Sort of Scale on the Tail, which makes a Noise. The Serpent bit him a little above the Ankle." Five months later the account continues: "His Leg still swelling, the Surgeon was apprehensive of a Mortification, and advis'd him to consent to have it cut off. He did so, tho' with Regret, the Operation was made, but a Fever follow'd immediately, and he liv'd but two Days, dying on the Feast of the Decollation of St. John Baptist, much lamented by all Men, and particularly by Monsieur de La Sale, to whom he was very serviceable, by reason of his general Knowledge, and his particular Fidelity towards him." [9]

It is of interest to mention another snake-bite case which occurred on this expedition. Father Douay records it: "Our Indian hunter Nika suddenly cried out with all his might, 'I am dead!' We ran up & learned that he had been cruelly bitten by a snake; this accident stopped us for several days. We gave him some orvietan, and applied viper's salt on the wound after scarifying it to let out the poison & tainted blood; he was at last saved." [10]

[9] Joutel, *op. cit.*, pp. 91 and 97.

[10] Douay, *op. cit.*, p. 201.

It is of especial significance that the wound was incised "to let out the poison." The practice of treating snake-bite by incision and suction, usually with the mouth, is very old. Celsus who lived during the reign of Augustus Caesar was familiar with it. And on down through the centuries it is mentioned with more or less confidence. But it remained for Dr. Dudley Jackson of San Antonio to supply the experimental proof that multiple incisions and prolonged suction constitute the only successful treatment for snakebite.[11] Doctor Jackson milked the venom from rattlesnakes and injected it into experimental animals. The poison was then removed by multiple incisions and suction, and the animals would survive even though four minimal lethal doses were injected and treatment delayed for one hour. As further proof that the poison was actually extracted, he was able to produce toxic symptoms and death by reinjecting the material into other animals. As the result of these experiments, the treatment of snake-bite has been put on a rational basis and the procedure of multiple incisions and prolonged suction by specially designed suction cups is recognized the world over as the only rational treatment.

After the time this amputation was done, the name of Liotot occurs only in some violent or some criminal capacity. When hunger and hardship substituted the law of the jungle for the law of France, Liotot took his place with the lawless felons. Because of a disagreement with Moranget over the marrow bones of a bullock, he conspired with Heins and Duhaut to murder Moranget, Saget and Nika. He had treated, with success and patience, an arrow-wound inflicted on Moranget by an Indian and he had been repaid by an outburst of abuse, so there was some ill feeling between the two men. Joutel gives a harrowing description of the cowardly crime: "They waited till Night, when those unfortunate Creatures had supp'd and were asleep. Liotot the Surgeon was the inhuman Executioner, he took an Ax, began by the Sieur Moranget, giving him many Strokes on the Head; the same he did by the Footman and the Indian, killing them on the Spot, whilst his Fellow Villains, viz. Duhaut, Heins, Teissier and Larcheveque stood upon their

[11] Jackson, Dudley, "First Aid Treatment for Snake Bite," *Texas State Journal of Medicine*, July, 1927, Vol. XXIII, pp. 203-209.

Guard, with their Arms, to fire upon such as should make any Resistance. The Indian and the Footman never stir'd, but the Sieur Moranget had so much Vigour as to sit up, but without being able to speak one Word, and the Assasins obliged the Sieur de Marle to make an End of him, tho' he was not in the Conspiracy." [12]

With blood on their hands, these three assassins craved for the life of La Salle himself and their revenge would not be complete with anything short of this. It should be recalled here that starvation, disease and Indian attacks of two years' duration had brought the colony to a deplorable state. It was completely isolated and its members had no idea of their geographic location. Several attempts had been made to find the Mississippi River but had failed. In final desperation a few men and women were left at Fort St. Louis and the remainder, including the conspiring participants of the approaching denouement, set out on their fateful journey. When they reached a point near what is now Navasota the conspirators laid an ambuscade and " shot Monsr. de la Sale thro' the Head, so that he dropp'd down dead on the Spot, without speaking one Word." The body was dragged naked among the bushes and left to be devoured by the coyotes. In base exultation Liotot's final words to La Salle were: " There thou liest, Great Bassa, there thou liest."

For two months the few survivors wandered aimlessly around East Texas like a band of marauding wolves. They agreed on nothing and snarled at everything. In May, 1687, retribution came. Dissension over division of the spoils was the cause of it all. Heins killed Duhaut and Ruter " fired his Piece upon Liotot, the Surgeon, and shot him thro' with three Balls." [13] Liotot lived long enough to make his confession and then Ruter " put him out of his Pain with a Pistol-Shot." Father Douay adds that " his hair and then his shirt, and clothes, took fire & wrapped him in flames, and in this torment he expired." [14] Joutel completes the picture: " We dug a Hole in the Earth, and bury'd him in it with Duhaut, doing them more Honour than they had done to Monsieur de La Sale and his nephew Moranget, whom they left to be devour'd by wild Beasts. Thus those Murderers met with what they had deserv'd, dying the same Death they had put others to." [15]

[12] Joutel, *op. cit.*, p. 133.
[13] *Ibid.*, p. 154.
[14] Douay, *op. cit.*, p. 216.
[15] Joutel, *op. cit.*, p. 155.

Liotot, then, traitor and murderer that he became, chose to put down the scalpel and the pestle and to take up the axe and the pistol. As long as the exploits of La Salle " the resolute " are remembered, just so long will the black soul of surgeon Liotot be depicted.

* * * * *

No more striking figure ever sped across the stage of Texas history than St. Denis. His vivid characteristics are epitomized in his own words on an occasion when his flashing career was temporarily halted: " I, Sieur Louis Juchereau de Saint Denis, a gentlemen by birth, a prisoner by oppression." In 1714, France and Spain being at war, Governor Cadillac of Louisiana sent St. Denis and a mere handful of followers to explore the land of Texas with a view to establishing trade with the Indians or for some other purpose not clearly understood. A year later this swashbuckler appeared at the presidio of San Juan Bautista on the Rio Grande, much to the dismay of the Spanish commander, Captain Diego Ramón. In rapid sequence,—rare outside the novelist's story,—he won the heart of Doña Maria, the captain's granddaughter, was sent to prison in Mexico City, escaped, married the girl, led a *Spanish* expedition across Texas and wound up with his Spanish wife as commander of the French fort at Natchitoches, Louisiana.

Such a soldier demands a fit companion and he found him in " his friend Jalot, the eccentric surgeon." History does not record much of surgeon Jalot except that where St. Denis went, there went Jalot also. Gayarre, through whose *History of Louisiana* there runs a thick thread of romance, pictures the surgical enthusiasm of Dr. Jalot in a way that would do credit to our modern-day radio apostles of rejuvenation. He is quoted *in extenso* because his account, more than any other, portrays for us some of the characteristics of this far from modest yet very human man. " On these occasions, St. Denis, protected against the arrows of the enemy by a full suit of armor, which he had brought from Europe, and mounted on a small black jennet, as strong as an ox and as fleet as the wind, would rush upon the astonished Indians, and perform such feats with his battle-axe, as those poor savages had never dreamed of. These encounters gave infinite satisfaction to Jalot, who was a passionate lover of his art, and who never was seen in a good humor, except when he was

tending a wound. But he had more frequently the chance of dissecting than of curing the poor Indians, for, in most cases, the stroke of the white man's weapon was certain and instantaneous death. Still, he found some compensation in the numerous wounds inflicted by the Indians on his own companions; he had a fondness for arrow wounds, which he declared to be the nicest and genteelest of all wounds. One day, he was so delighted with a wound of this kind, which he pronounced, much to the exasperation of his patient, to be supremely beautiful, that he actually smiled with self-gratulation and cracked a joke!—to do this, his excitement must have been immense. Another day, when an Indian had been struck down by the battle-axe of St. Denis, without, however, being killed outright, he felt such a keen professional emotion at the prospect of probing and nursing a gash which he thought rare and extraordinary, that he frantically jumped upon St. Denis, hugged him with enthusiasm, called him his best friend, passionately thanked him for the most valuable case he had given him, and swore that *his Indian* should be carried on, whatever impediment it might be to their march, until he died or was cured. Who would have thought that this man, when he was not wielding his surgical instruments, was the most humane being in the world, and concealed, under an appearance of crabbed malignity, the tenderest sensibilities of the heart? Such are the mysteries of human nature!" [16]

And one other time Gayarre, in literary effervescence, presents surgeon-hero Jalot. Here it must be explained that Governor Gaspardo Anaya was also a suitor for the hand of fair Doña Maria. (The plot had already thickened when Maria exclaimed: "Tell Anaya that I can not marry him as long as St. Denis lives, because St. Denis I love; and tell him that if St. Denis dies, this little Moorish dagger, which was my mother's gift, shall be planted, either by myself or my agent's hand, in the middle of his dastardly heart, wherever he may be." These words were spoken with a gentle voice and calm mien and with such a gleam in the eye as is nowhere to be seen except in Spain's or Arabia's daughters.) The words of this imaginative historian glorify the supreme skill of sur-

[16] Gayarre, Charles, *History of Louisiana, The French Domination*, 2 Vols., New York, 1854, Vol. I, pp. 168-169.

geon Jalot, his intense magnanimity and his burning scorn: "On the forced departure of St. Denis for the city of Mexico, Jalot had been set at liberty, and had ever since remained at Caouis waiting for the decision of the fate of St. Denis. He was known to be a physician, and as he was the only one within a radius of one hundred miles, he was soon in full practice. In the course of a few months, he had performed so many cures and rendered so many services, that he was looked upon as something almost supernatural. One day, he was summoned to the house of the governor, Don Gaspardo Anaya, whither he went with such a grim smile as clearly indicated that his feelings were in a violent state of excitement. He examined with the most minute care the body of that dignitary, and on his being asked his opinion on the situation of his patient, he went into the most luminous exposition of his disease, and declared that if a certain operation, which he described with much apparent gusto, was not performed, the sick man would certainly die within one month. 'Well then,' said the governor, 'go on with the operation, as soon as you please.' 'It shall never please me,' cried Jalot, in a voice of thunder; and shaking his fist at the enemy of St. Denis, whom, in his turn, he had now in his power, he doggedly withdrew from the house of the infuriated governor. Remonstrances, entreaties, large offerings of money, threats, could not bring him back. At last the governor swore that he would hang Jalot, and sent some soldiers to arrest him. But the people, who loved Jalot, and feared being deprived of his invaluable services, rose upon the soldiery, beat them off, and proclaimed that they would hang the governor himself, if he persisted in his intention of hanging Jalot. Matters were in this ticklish situation, when St. Denis returned to Caouis.

"In company with his friend Jalot, who was almost distracted with joy at his safe return, St. Denis immediately waited upon the governor, to whom he communicated a letter patent, by which the Viceroy gave authority to St. Denis to inflict upon Anaya, for his abuse of power, any punishment which he might think proper, provided it stopped short of death. The terror of the governor may easily be conceived, but after enjoying his enemy's confusion for a short time, St. Denis tore to pieces the Viceroy's letter, and retired, leaving the culprit, whom he despised, to the castigation of heaven

and to the stings of his own conscience. He did more: he had the generosity to request Jalot to perform the operation which this worthy had hitherto so obstinately refused to do. The surgeon, who was mollified by his friend's return, consented, not however without terrific grumblings, to use his surgical skill to relieve the bedridden governor, and he admirably succeeded in the difficult operation upon which the fate of his patient depended. But he peremptorily and contemptuously refused the fee that was tendered him, and informed the governor, face to face, and with his roughest tone, that he deserved no remuneration for the cure, because he had saved his life merely out of spite, and under the firm conviction that he would ere long die on the gallows." [17]

Ruth Cross in her delightful historical novel has Jalot to make this diagnosis of Don Gaspardo's ailment: "You've committed a crime against your stomach and entrails, not once, but everytime you sat down to the table. Your punishment is fitting." [18] And later he adds: "I should have carved his guts out instead of saving him with an innocent cathartic." This, of course, was before he had decided to operate.

In an unidentifiable fragment supplied by Ken McClure there is a quotation descriptive of St. Denis' return from prison: "Here they found Jalot awaiting his master. Jalot had lived all the time from his trade as chirurgeon and had gained a great reputation among the Spaniards for his cure of many diseases to which they were subject." Penicault states that these diseases were quartan malaria and dysentery.[19] The account concludes by saying that, although St. Denis lodged at the best inn of the place, he would have fared badly had not Jalot himself prepared his food. Such a service on the part of Jalot should not be interpreted as menial, when it is recalled that this was well over 200 years ago, a time when the barber-surgeon was in his heyday. At this time in Europe, the *barbitonsores* combined the function of a "a bath keeper who in addition to bleeding, cupping and leeching, gave enemas, picked lint and extracted

[17] *Ibid.*, pp. 177-178.

[18] Cross, Ruth, *Soldier of Good Fortune*, Dallas, 1916, p. 151.

[19] Quoted by Charles B. Reed, "Sieur de St. Denis and Jallot, his Valet de Chambre," *Northwestern University Bulletin*, Vol. XXXIV, March 19, 1934, p. 12.

teeth." [20] All of which meant that the barber-surgeon took rank alongside the "bath keeper, sowgelders and wayfaring montebanks." He was "a sterile pedant and coxcomb, red-heeled, long-robed, big-wigged, square-bonnetted, pompous & disdainful in his manner, making a vain parade of his Latin, and, instead of studying and caring for his patients, tried to overawe them by long tirades of technical drivel." [21]

So if surgeon Jalot treated and shaved and served St. Denis, it was for the same reason that his barber-surgeon treated and shaved and served Frederick the Great. Jalot himself understood and must have appreciated his position when he said, "I am Medar Jalot, valet, surgeon and general assistant of M'sieur Louis. I accompanied him from Quebec to Paris, from Paris to Louisiana, from Louisiana to this place, and from here God alone knows where." [22]

As Penicault records, when St. Denis wanted something done it was Jalot's advice and service that he utilized. When St. Denis had a hazardous undertaking to carry out with the Indians, "he mounted his horse and, followed by Jalot, his valet, he set out toward the Indian village." [23] When St. Denis had arranged his articles of marriage, Jalot was dispatched to Coahuila to make the necessary purchases.

Penicault, at times in a vein similar to that of Gayarre, makes it difficult to separate fact from fiction. On the much discussed and most improbable journey of St. Denis to Louisiana and his dramatic return to the Rio Grande, Penicault assigns to Jalot a major rôle. It was Jalot who led St. Denis, by routes well known to himself, speedily to the door of Doña Maria; it was Jalot who helped to shield and serve his master during the ten months spent at the home of his wife's father. Into Jalot's mouth were put some of Penicault's most romantic words: "The most surprising thing about it was that Saint Denis spent nearly a year in this manner,

[20] Garrison, Fielding H., *An Introduction to the History of Medicine,* Philadelphia, 1914, p. 115.

[21] *Ibid.*, p. 223.

[22] Cross, *op. cit.*, p. 28.

[23] Margry, Pierre, *Découvertes et Établissements des Francais dans l'ouest et dans le Sud de l'Amérique Septentrionale* (1614-1754), 6 Vols., Paris, 1878-1888, Vol. V, p. 533.

never going out of his wife's bedroom, except late in the evening when he used to go out for a walk under the trees in the garden of the house. Doña Maria, his wife, during this time became pregnant with his second child. I believe that it was this that kept Saint Denis from becoming bored, for they loved each other more tenderly than ever before." [24]

Now, Jalot may have been humble, certainly he was human and he knew the meaning of tedium. So he continues: "As for me, I have never spent days that seemed so long, especially during the winter, when one could not walk in the garden because of the cold weather. Often in the afternoon, when the street door was closed, I would warm myself by the fire in the kitchen, together with a large and homely servant named Luz, who was more aggressive than the daughter of the most celebrated barber in Mexico."

There is some doubt as to whether Jalot remained in Coahuila as indicated in the preceding quotations from Gayarre or continued on to Mexico City with St. Denis, a nominal prisoner as was his master. Castañeda states that he was the only companion on this journey; [25] while Morfi quotes Prévost as stating in one place that he did accompany St. Denis to Mexico City and in another that he stayed in Coahuila where he was held "in high esteem for his ability in surgery." [26]

Credence is lent to the fact that he remained behind in Coahuila by a suggestion most reluctantly made, a suggestion that might strip St. Denis of some of his historical romance. Castañeda quotes Father Antonio Olivares as having some doubt as to who actually married Maria Ramón. This is Father Olivares' quotation: "Either Medar Jalot or St. Denis married at the Presidio of Rio Grande a granddaughter of Diego Ramón." [27] And then he concludes by saying, "Although I do not doubt that one of the two married the granddaughter of Captain Ramón, I have not been able to determine with any certainty which of the two did." It is conceivable that

[24] *Ibid.*, p. 560.

[25] Castañeda, Carlos E., *Our Catholic Heritage in Texas, 1519-1936*, 7 Vols., Austin, 1936, Vol. II, p. 32.

[26] Morfi, Fray Juan Agustin, *History of Texas, 1673-1779*. Translated by Carlos E. Castañeda, Albuquerque, 1935, p. 170.

[27] Castañeda, *op. cit.*, p. 26.

Surgeon Jalot, no doubt well schooled in the bewitching technique of his master, may have improved the opportunity afforded by the long absence of St. Denis and laid successful siege to the heart of Doña Maria.

But such a suggestion, however hesitatingly made, should be absolutely taboo. History has accorded the hand of fair Maria to Louis Juchereau de St. Denis and this should be the conclusion of the whole matter.

The conclusion of Surgeon Jalot is more difficult. The conclusion, drawn from the last available record, is most inglorious,—wholly out of harmony with the dignity of the surgeon, valet and general assistant to St. Denis. Captain Don Domingo Ramón in his diary draws the curtain on our surgeon-hero in these words: "Jean de Mendar of French descent fell from his horse, because the animal caught its foot in a hole." [28] The place was on Texas soil 10 leagues from the Rio Grande. The time was the 28th day of April in the year of 1716.

[28] Ramón, Don Domingo, *Diary of His Expedition into Texas in 1716.* Translated by Paul J. Foik. Texas Catholic Historical Society, *Preliminary Studies,* Vol. II, No. 5, April, 1933, p. 9.

PEACOCK AND CONGENITAL HEART DISEASE

Thomas Bevill Peacock (1812-1882)

NATHAN FLAXMAN
Instructor in Medicine, Loyola University Medical School, Chicago

Thomas Bevill Peacock was born in York on December 21, 1812. He was of Quaker parentage, his father, Thomas, a merchant of the town, and his mother, Sarah (née Bevill), a native of Cambridgeshire. There were three brothers, none of whom attained adult life, and a sister to greet the newcomer. Shortly after his birth the family moved to Scarborough. When young Thomas was nine years old he was placed at a boarding school in Kendal, kept by a Mr. Samuel Marshall. He remained almost seven years at this school, when, as a second choice, he decided to enter the medical profession.

I. Medical Education

At the age of 16 years, upon being opposed in his wish to become a sailor, Thomas was apprenticed to a surgeon of Darlington, Mr. John Fothergill, with whom he remained five years, completing the term of service in 1833. Following this, as was the custom at the time, he became a student at University College in London. There he met Davies-Colley of Chester, also a student, and thus commenced a life-long friendship. Amongst others, they attended the lectures of Dr. Elliotson on medicine and those of Mr. Samuel Cooper on surgery. Thomas took extensive notes in class, and in the evening he elaborated on these notes. While pursuing the medical studies he also paid attention to dentistry, but only at his father's request. For a while he spent some time each day with Mr. Nasmyth, the eminent dentist of George Street in Hanover Square. He soon tired of this and within a short time devoted himself to medicine entirely. Then for twelve months he attended the surgical practice at St. George's Hospital.

In 1835 many happenings made his life one of joy mixed with sorrow. First he became a member of the College of Surgeons, then a licentiate of the Society of Apothecaries. The intensive prepara-

tory work led to a breakdown in health and he was advised to take a long sea voyage. In 1835 he made a trip to Ceylon, and the following year he made a second voyage to the same place. Shortly after the second trip he studied for several months in Paris, not as a registered student but as a visiting doctor.

After he became qualified, his first appointment was as house surgeon of the Chester Infirmary, in which city his family had taken up residence in 1833. For four years he remained at Chester, worked unusually hard taking extensive notes of the cases, performing and making exact records of postmortem examinations, and preserving many valuable surgical and pathological specimens. Peacock considered the four years spent in the Chester Infirmary as a very important era in his professional career, and always referred to the period as one of gratifying work. As though these years of study and work were not sufficient, he went to Edinburgh in 1841 and graduated in 1842. For some time he acted as house physician to the Royal Infirmary and was also appointed pathologist there. He enjoyed the time at Edinburgh immensely, especially the instruction derived from Dr. Alison. In addition, he made many friends, gained considerable experience in respect to fevers and did a great deal of work in morbid anatomy. Thus, at the age of 32 Peacock had completed a five years surgical apprenticeship, two years of lectures at the University College, a short dental apprenticeship, a solid year of surgical rounds at St. George's Hospital, several months in Paris, four years as house surgeon to the Chester Infirmary, another year of classes at Edinburgh, and finally a year as house physician to the Royal Infirmary during which period he acted also as pathologist to this institution. He was a very well prepared physician for the period in which he lived, and excellently trained even for the place and the time in which he chose to practice his profession.

II. Medical Practice

In 1843 Peacock came to London as the place in which to enter private practice, and in the following year he became a licentiate of the Royal College of Physicians. His first appointment was to the Aldersgate Street Dispensary, and then he received one to the Royal Free Hospital. About the same time, with the assistance of the

Gurneys, Barclays, and Tuckers, to the latter of which he became related by marriage in 1850, he started a dispensary for the diseases of the chest in Liverpool Street. Mainly through his own efforts and exertions, it became the celebrated Victoria Park Hospital for Diseases of the Chest. He developed a deep affection for this institution, devoted a large proportion of his active professional life to it, and afterwards it became the City of London Hospital for Diseases of the Chest.

After six years of faithful work in the Aldersgate Street and the Royal Free Hospital Dispensaries, Peacock severed his connections with them, only because he was appointed assistant physician to St. Thomas's Hospital. Between the two hospital appointments and private practice he led a busy life. At St. Thomas's he very shortly began to occupy a prominent position. Students were attracted to him by the thoroughness and conscientiousness of his work, and the extent and precision of his pathological and clinical knowledge. In addition, his genuine kindness and simplicity of manner won for him the respect and admiration of all with whom he became associated. He took an active and leading part in the affairs of the hospital and the school. For some years he lectured on Materia Medica, and for many more years on Medicine. He conducted the skin clinic for several years, and took a warm interest in the school of nursing at St. Thomas's, which led him to give an annual course of lectures to the nurses.

Peacock kept careful notes of all cases, of the pathological lesions in those that came to autopsy, and was constantly dissecting and putting up specimens. The enormous amount of material collected in this way was not wasted. He was a frequent contributor to the medical journals, starting first in Edinburgh and continuing for several decades. Most of his important contributions to medical literature were condensed epitomes, as they were termed, of his experience and reading, and contained careful and well-considered statistics. Some considered his works to be only of value as reference works and not for continuous reading, yet they are so clear that they can be read today within a short time and much of the material retained. His contributions to the medical journals and to the transactions of the various societies, especially the Pathological

Society of London, were innumerable. As a teacher it is related that he exhibited the same qualities he had as a writer. He was conscientious, laborious, accurate and statistical. A clear but rapid speaker, his instructions, whether by the bedside or in the lecture hall, were considered valuable, though somewhat dry.

It is difficult to give an adequate description of the man, his appearance and his personality. To those who knew him intimately, and he had few intimate friends, he was simply a middle-sized, sandy-haired, homely looking man, grave and reserved in manner. Certainly, remembering his Quaker origin, he was not a demonstrative man, for he took a very serious view of life, its duties and responsibilities. However, according to those who knew him well and appreciated him best, he had many fine qualities. They knew him to be perfectly truthful and conscientious. They never heard him speak against his neighbor. He always recognized the good qualities possessed by those with whom he came into contact. Slow to form opinions, not bigoted, but to those opinions which he formed he adhered. Most of all his few intimate friends recognized that he was a man of great resolution and courage, and whatever he determined on as right, that he did with all his might in spite of opposition and discouragement. They considered him a warm, faithful, and unchanging friend. Outwardly he appeared cold and unapproachable, but he was kind-hearted and often made self-sacrifices for the sake of others. His greatest affection was shown toward his patients, the nurses who were connected with him, and the pupils who worked under him. All who were brought into close professional relationship with him could not help but feel this kindliness which he tried so hard to cover up constantly.

In 1850, at the age of 38, he married Cornelia Walduck, also of Quaker descent. She possessed every qualification to make him happy, but she remained childless. His great longing was to have children and to lead a normal family life, but she was delicate and therefore, a constant source of anxiety to him. His friends felt that this was very likely the chief cause of his apparent sadness, the disappointment and sorrow which accompanied his domestic life. When she died in 1869, after a brief illness, it left him a solitary man. It was a great loss from which he never seemed to recover.

He enjoyed traveling and possessed an intense love for the sea. His journeys, which were frequent and constant even during the late years after the death of his wife, extended to practically all the Mediterranean seaports, to North America, and to Brazil. Most of these trips were spent in adding to his knowledge. He made a point of studying architecture and archaeology, for he was well informed on these subjects. He also acquired a sound judgment and cultivated taste in the domain of art. Whenever the opportunity arose he never failed to visit and make notes of the hospitals and hospital practice. It is said that several papers recorded the results of such inquiries and appeared from time to time in the medical journals, but no record of them has been found. Either they were recorded in journals which are not now extant or they were simply added without being listed in the indices. There seems to be no other way to account for the inability to locate the records mentioned.

During the later period of his services to the St. Thomas's Hospital he acted also as Dean of the Medical School. He was a Fellow of the Royal College of Physicians, as mentioned, where he filled the offices of censor and Croonian lecturer. In conjunction with Dr. Wilks, he was the first appointed examiner in medicine to the Royal College of Surgeons. Both the National Provident and Friend's Assurance Companies appointed him their physician. The College of Surgeons awarded him a gold medal for a valuable series of pathological preparations which he had presented to them. Most important to him, however, was that in spite of his hospital connections, writings, teaching, and traveling, he had a large private practice for many years.

For 37 years Peacock was a Fellow of the Royal Medical and Chirurgical Society of London where he was a member of the council, on the library committee in 1855, secretary the following year, referee from 1857 to 1865, and vice-president in 1867. His chief appointment was to the St. Thomas's Hospital and Medical School, where he came daily for 28 years as assistant physician and physician, from 1849 to 1877. After the latter date and up to the time of his death he ranked as consulting physician.

III. Lonely Years

Of late years his loneliness increased, not only due to the loss of his wife for whom he so greatly grieved, but also due to the fact that most of his medical friends, with whom he had been chiefly familiar, had left the neighborhood in which he resided throughout his London career. He established himself at 20 Finsbury Circus, and there he remained until his death. His medical friends were either carried off by death or migrated to the west. Then for the last five years of his life failing health prevented him from availing himself of such social occasions as still offered themselves.

Without any warning, and in the full swing of active professional life, he suffered a left hemiplegia. This sudden attack occurred in February, 1877 a few hours after he had listened to Sir James Paget's Hunterian Oration at the College of Surgeons. He was to have been a guest at the Hunterian banquet later in the day, but his seat remained empty. This attack laid him up for many months, and led to his giving up all his public appointments. After a partial recovery he continued to practice, but not actively. Although he continued to appear at the meetings of some societies and superintended some publishing work, he labored under the heavy disadvantages of failing physical power and mental weariness. All of this was painfully apparent to his friends.

About 15 months before his death he had a second slight seizure which partially affected his right side and again he recovered. However, he was obviously enfeebled and had by then lost his characteristic power of sustained effort. The last and fatal attack occurred on the 30th of May, 1882, in St. Thomas's Hospital, where he had accompanied some friends. He fell down in one of the corridors and was carried into the ward to which he had been physician for many years. Death occurred the same evening, at the age of 69, in the very place which probably in health he would have chosen to die in. His mortal remains were laid to rest beside those of his deeply-mourned, dearly-loved wife in the "Friends' Burial Ground" at Tottenham. Two sisters, of a family of seven, survived him.

Peacock left behind the reputation of a simple and kindly man; of an eminent pathological anatomist; of a serious and accurate

teacher; of a learned and sound practitioner. He had taught well and accurately, yet his students never considered his method of teaching either interesting or attractive. For it consisted mainly of a careful personal examination of each patient and in dictating aloud to his clerks, who were expected to take down the words exactly, the results of the examination, the diagnosis, and the treatment. If this be so, and there is no evidence to the contrary, Peacock was a great teacher living ahead of his time. Apparently it was the unusual in a period of ordinary teaching, for his methods resemble those used at the bedside today.

IV. The Pathological Society of London

When the Pathological Society of London was established in February of 1847, Peacock was among the founders. Others were Bence Jones, C. J. B. Williams, N. Cheevers, Babington, J. R. Bennett, and R. Quain. At the first meeting, on October 20, 1847, 106 members were enrolled who were particularly interested in pathological studies and Williams was elected president. The first volume of the transactions of this society, which was destined within a short time to assume an outstanding position among the members of the profession, was published in 1849. According to the dates of this volume, 1846 to 1848, agitation was apparently begun the year before the actual establishment of the society to found such an organization. These volumes of the transactions, each and every one of them, are a veritable pathological nugget and "worth its weight in gold." The society met every two weeks from October to June and ten to twelve specimens were exhibited and discussed at each meeting, so that the transactions contain the reports and discussions on thousands upon thousands of pathological specimens from man and animal.

According to the first volume of the transactions Peacock reported and exhibited 19 different specimens in the first two years. He continued doing this year in and year out and in the next sixteen years reported an additional 72 specimens, making a total of 91 case reports in the first 15 volumes of the transactions. During his entire career, over a period of 35 years, he exhibited a total of 158 specimens before the Society.

The first volume of the transactions includes, among others, reports by Bence Jones on " Meningeal Apoplexy " and " Tuberculous Deposits in the Pons Varolii and Cerebellum "; by C. J. B. Williams on " Melanotic Cancer in the Spinal Canal, Orbit, etc." Under the diseases of the nervous system Peacock reported on " Extravasation into the Pons Varolii and Crura Cerebri," the case of a 66 year old female who died shortly after the onset of cerebral manifestations.[1] Under the malformations of the heart a total of 15 cases were exhibited, three of them by Peacock. Only the work of others will be mentioned from the first volume of the transactions to illustrate that Peacock had a tremendous amount of material at first hand when he later decided to write his original monograph on the " Malformations of the Human Heart."

In that volume Ramsbotham reported on " The heart of an infant consisting of only one auricle and ventricle "; Forster on " A heart consisting of only two cavities "; Crisp on a " Heart consisting of a single auricle and ventricle," and on a " Malformation of the heart consisting in an imperfect separation of the two ventricles with absence of the pulmonary artery "; N. Ward for N. Parker on " Malformation of the heart, great contraction of the pulmonary orifice, aorta arising from the right ventricle, and aperture in the septum ventriculorum "; E. Smith on " Premature occlusion of the foramen ovale, large pulmonary artery and duct, and contracted left heart "; N. Cheevers on a " Case illustrating the earliest stage of malformation usually known as distribution of the descending aorta from the pulmonary artery "; Babington on " Cyanosis dependent on patent ductus arteriosus with disease of the aortic valves "; Dalyrymple on a " Diseased heart, in which the root of the aorta had an opening common to the two ventricles "; J. R. Bennett on " Perforation of the ventricular septum of the heart "; R. Quain on a " Heart with a congenital perforation at the base of the septum ventriculorum "; and on " Remarkable contraction of the ductus arteriosus in a new born infant."

The three cases reported by Peacock were as follows: a malformation of the heart consisting in contraction of the orifice of the pulmonary artery with deficiency at the base of the inter-ventricular septum in a child approximately 2½ years old who had exhibited

well marked symptoms of cyanosis, which commenced three months after birth;[2] the case of a ten week old infant who had displayed slight cyanosis during life from imperfect dilatation of the branches of the pulmonary artery with an open foramen ovale;[3] and the case of an 11 year old girl, history unknown, who had a malformed heart consisting of imperfect auricular and ventricular septae.[4]

Peacock reported many more cases and demonstrated specimens other than those on the malformations of the heart. Under the diseases of the heart he demonstrated a specimen with great contraction of the mitral valve and coagula in several branches of the pulmonary artery from a 68 year old woman;[5] and a rupture of the aorta, about half an inch behind the origin of the left subclavian artery, from a 35 year old male whose chest had been suddenly compressed by a wooden frame weighing 300 pounds.[6]

Under the diseases of the digestive organs he reported cases of post-pharyngeal abscess,[7] carcinomatous disease of the pylorus,[8] and internal strangulation between bands of mesentery with fibrous polypus of the intestines.[9] He also exhibited a specimen from a 79 year old male which showed interstitial disease of the neck of the femur following injury.[10]

During the next term of the Society Peacock exhibited nine specimens. From a 20 year old female an apparently acquired tricuspid stenosis with an open foramen ovale.[11] Another heart, from a one year old infant who had been cyanotic during life, showed an absence of the pulmonary artery with the aorta arising chiefly from the right ventricle and giving off the pulmonary branches through the ductus arteriosus. From a 39 year old female, a hypertrophied heart which had extensive aortic and mitral valvular disease and pericarditis.[12] In another heart, from a 51 year old male, he demonstrated an aneurysm of the left coronary artery [14] and remarked that "The specimen was almost unique, no allusion being made to the occurrence of aneurism of the coronary arteries by any of the systematic writers on pathological anatomy, or on diseases of the heart." A typical aneurism of the ascending aorta from a 40 year old male,[15] and an aneurism of the arch of the aorta which produced pressure on the recurrent laryngeal nerves and opened into the trachea from a 29 year old female.[16] Among other conditions ex-

hibited by him were the stomach of a 50 year old male in which an ulcer had produced death by eroding a large artery;[17] a specimen from a 27 year old female with an ulcerated aperture between the gall-bladder and duodenum by which a biliary calculus had passed into the intestine and produced an obstruction;[18] and also a specimen from a kidney showing oxalate of lime calculi in the pelvis.[19]

Session of 1848-49 and 1849-50: Peacock exhibited seven specimens in the two years. A contracted pulmonary orifice with partial origin of the aorta from the right ventricle.[20] A dissecting aneurism with spontaneous rupture of the aorta and diseased aortic valves.[21] A case of angina pectoris dependent on disease of the coronary arteries, from a 60 year old female.[22] Endocarditis, with destruction of one of the aortic valves and partial perforation of the septum of the ventricles, from a 32 year old male.[23] A benign stricture of the sigmoid flexure of the colon, from a 22 year old female.[24] Two specimens of meso-colic hernia.[25] And an abscess in a cyst of a hydatid in the liver bursting into the lungs, from a 20 year old female.[26]

Session of 1850-51: Latham became president at this session and Peacock was appointed honorary secretary. He demonstrated only three specimens, the heart of a 34 year old sailor showing injury of the aortic valves from violent muscular effort;[27] the heart of an 18 year old male showing obstructive and regurgitant disease of the aortic valves;[28] and mitral valvular disease in the heart of a 39 year old female.[29]

Session of 1851-52: Peacock became one of the eight vice-presidents and exhibited five specimens. One was a small aneurism of the left ventricle and mitral valve in the heart of a 60 year old male,[30] the specimen having been forwarded to him by Dr. Thurnam, resident physician to the Wiltshire County Asylum. Another heart, from a nine year old girl, showed regurgitation through the left A-V aperture from dilatation of the orifice.[31] From a 40 year old male a heart with obstructive disease of the aortic valves, dependent on malformation,[32] and from a 33 year old female one with obstructive and regurgitant disease of the aortic orifice.[33] He also reported on this and other cases of malformation of the aortic valves,[34] in

which he discussed fully the entire subject after a case report by Dr. Risdon Bennett. And the final specimen was from a 57 year old male who had diseased aortic valves, the patient having been attended by Mr. Pye Smith.[35]

Session of 1852-53: Twenty-four year old Jonathan Hutchinson became a member of the Society at this session, during which Peacock exhibited four specimens. From a 16 year old female, he showed an encephaloid cancer of the dura mater and of the periosteum of the spine, ribs, etc.[36] He exhibited a series of preparations intended to illustrate the mode of closure of the foramen ovale after birth.[37] At the request of the members of the Society he reported on the case of Dr. Hale, who had exhibited a heart with a single ventricle from a four month old infant.[38] And, from a case seen in consultation with Mr. Orton, Peacock exhibited a specimen showing a calculous abscess in the pelvis.[39]

Session of 1853-54: Dr. Thurnam sent him another specimen, a cholesteatomatous tumor of the brain, which Peacock exhibited to the Society and at the following meeting, as requested, Dr. Bristowe made a report on it.[40] On another case, fibrinous casts of the bronchial tubes, reported by Dr. Fuller, Peacock made 21 pages of remarks with a table in which he listed all previously reported cases.[41]

Among the pathological hearts demonstrated, Peacock exhibited five unusual specimens. From a seven month old infant a contraction of the right A-V orifice with two small apertures in the ventricular septum,[42] and he believed the case showed disease of the tricuspid valve which commenced during intra-uterine life. Mr. Marshall of Mitcham sent him a specimen from a 6½ year old boy which had a greatly contracted pulmonary orifice with a deficiency in the ventricular septum and an open foramen ovale.[43] Mr. J. W. Trotter exhibited a case of diseased aortic valves and one month later, after he had carefully dissected out the orifice, Peacock reported on the condition of the aortic valves.[44] A fourth specimen, from a 65 year old male, sent to him by Mr. Henry Ewen of Long Sutton, showed an aneurismal cavity at the apex of the left ventricle and extremely diseased coronary arteries.[45] This patient had suffered from distressing dyspnea, and, some weeks before he died, the

pain in the region of the heart was of the most agonizing character. The fifth specimen [46] shown by Peacock was the heart of a 62 year old man, sent by Mr. G. F. Lane, the patient having suffered pain over the ensiform cartilage four or five days before death. The coronary arteries were studded by patches of atheroma and bone, and death was due to a ruptured ventricular septum.

Session of 1854-55: Only four specimens were exhibited by Peacock at this session. The first [47] was a heart from an eight month old infant, given to him by Mr. Wordsworth, which had both auricles opening into the left ventricle with transposition of the aorta and pulmonary artery. Later he exhibited specimens to illustrate observations on the weight of the heart in health and disease.[48] Forwarded to him by Mr. Henry Ewen of Long Sutton was a diseased heart from which a musical murmur had been heard during life.[49] The sound was reported to have been heard at a distance of several feet from this 65 year old patient, but only a double aortic lesion was present to account for it. The fourth case was unusual also, in that he exhibited a specimen from a mouse, cysts containing the cysticerus fasciolarus.[50]

Session of 1855-56: In this session Peacock exhibited the usual number of specimens. A fibrinous cast expectorated in a case of hemoptysis,[51] the full report on the case having appeared in a paper on plastic bronchitis in 1854. Two cases of malformed hearts [52] were presented at another meeting, one from a 19 year old female who had a contraction of the pulmonary orifice with an imperfect ventricular septum and an ossified ductus arteriosus; the other from a year old child who had a contracted pulmonary orifice and artery with an imperfect ventricular septum and no ductus arteriosus. Later he exhibited two specimens of diseased hearts,[53] the first that of aggravated disease of the aortic valves from a male of 45, and the second showed a complete destruction of the chordae tendineae in the left ventricle of a 16 year old female. Other specimens exhibited by him were one of diseased aortic valves in the heart of a 64 year old male,[54] the specimen having been sent to him by Dr. Thurnam of the Wilts County Asylum; with Dr. Bristowe, a case of blocking up of both internal carotid arteries by coagulum; [55] and

finally an impacted calculus with a sacculated kidney from a 20 year old female who died of pulmonary tuberculosis.[56]

Session of 1856-57: During this session Peacock exhibited a number of specimens, but not the unusual cases. Some cretaceous masses [57] expectorated by a 35 year old female, seen as an outpatient at St. Thomas's, in good health; he believed that they were expectorated not from the lungs, but from the bronchial glands which had been tuberculous in early life. A case [58] of mitral valvular disease in a 19 year old female; and a large aneurism of the ascending aorta pressing upon the right auricle and ventricle, the latter specimen [59] having been forwarded to him by Mr. Penhall. And with Dr. Bristowe, two cases,[60, 61] of cancer of the supra-renal capsules and of other organs but with no discoloration of the skin, one from an 18 year old female and the other from a 55 year old male.

Session of 1857-58: Peacock exhibited only four specimens before the society in the year. One consisted of fibrinous casts of the bronchial tubes expectorated by a 27 year old male; [62] another was a heart with obstructive and regurgitant disease of the aortic valves, probably dependent on a congenital malformation.[63] With Dr. Bristowe, a case [64] which they termed " blocking of the cerebral arteries " in a 35 year old male; and, lastly, a case of aortic valvular disease with obstruction caused by a band membrane extending across the outlet of the ventricle.[65]

Session of 1858-59: In 1848 Mr. Gay referred a one year old boy to him because of the symptom of cyanosis and the suspicion of a congenital heart lesion, and for ten years Peacock kept the boy under observation. Death occurred in the 11th year and no malformation of the heart was found; the brain was exhibited as that of an idiotic boy and to account for the cyanosis.[66]

In 1852 [67] Peacock published a short memoir on the subject of rupture of the heart valves by violence, in which he collected the particulars of 11 cases, and he exhibited, in this year, a heart [68] from a 36 year old dock laborer who had been struck in the chest by a hogshead, the violent force having ruptured the aortic valves.

He exhibited two hearts with uncommon defects, a contraction of the pulmonary artery orifice due to fusion of the valves from a 23

year old male who had no cyanosis,[69] and, an open foramen ovale from a 24 year old female who had been cyanotic.[70] The relation of cyanosis to the admixture of blood was illustrated by these cases. Among other specimens were a carcinomatous stricture of the esophagus,[71] multiple ulcers of the stomach,[72] and with Dr. Bristowe, a stricture of the ileum with the accumulation of plum-stones above the seat of the stricture.[73]

Session of 1859-60: Three trustees were elected by the Society during this session, and Peacock was one of those so honored. He exhibited the malformed heart of a one year old infant [74] which had a small sized pulmonary artery with the aorta arising from both ventricles; a rheumatic heart with mitral and aortic disease; [75] and a largely open foramen ovale, which freely admitted the passage of a shilling, from a 16 year old female who had no cyanosis and died of pulmonary tuberculosis.[76] The last case reported by him that year indicated how hard he tried to obtain autopsies.[77] Owing to the rule which forbade the examination of patients who died at St. Thomas's Hospital, without the permission of their relations, the body could not be opened, and it was only after much persuasion that the kidneys and supra-renal bodies were allowed to be examined, but by mistake the former were removed, while the latter were left in. By visiting the house to which the body had been taken, Peacock obtained liberty to reopen the abdomen, and with the assistance of Mr. Hughlings Jackson, removed the supra-renal capsules.

Session of 1860-61: Continuing his earlier observations [78] on the weight and specific gravity of the brain, he again exhibited specimens [79] before the Society. He showed another case of "Mill-stone-Makers' Phthisis" and demonstrated the siliceous matter found in the lungs.[80] The heart of a 43 year old male which showed retroversion of one of the aortic valves and destruction of the chordae tendineae of the mitral valve; [81] this description fits the modern diagnosis of subacute bacterial endocarditis, for even "the kidneys were minutely congested and studded with red bloody points."

From a 30 year old male he exhibited an aneurism of the inferior mesenteric artery, with small sacs in the ascending aorta,[82] illustrat-

ing the mode of formation of aneurisms. At another time he showed the heart of a 27 year old male who had obstructive disease of the aortic and mitral valves.[83] The last case of the season was a calcified tumor removed from the abdomen of a 90 year old woman.[84] Dr. Edmund Montgomery examined the tumor specimen, and at the next meeting reported on it as a calcified uterine fibroid.

Session of 1861-62: Four heart specimens were exhibited by Peacock in this session. The first was an open ductus arteriosus from a 60 year old male.[85] A second was from a 35 year old male, a large aneurism of the descending thoracic aorta which had produced pressure on the left recurrent laryngeal nerve, involved the left lung, and proved fatal by rupturing into the left pleural sac.[86] From a nine year old boy, whom he had under observation for five years, he exhibited a malformed heart,[87] consisting of a contracted pulmonary artery orifice and a ventricular septal defect. The last cardiac specimen was from a 35 year old male, whom he had seen in consultation at the request of Mr. Jonathan Hutchinson; it was a greatly enlarged heart, weight 800 grams, and no valvular disease.[88] Lastly he exhibited a stricture of the sigmoid flexure of the colon from a 43 year old female.[89]

Session of 1862-63: During this year Peacock showed an interesting variety of cases. One was a carcinoma of the left lung [90] with secondary deposits in the heart, kidneys, supra-renal glands, and intestines in a 31 year old male. He reported on cases of dissecting aneurism [91] after specimens shown by Dr. Bristowe and Mr. Gaskoin. From two previous articles published on the subject,[92, 93] Peacock discussed the forms of aneurism, influence of age and sex, the situation of the perforation in the internal coats and extent of separation of the tunics, condition of the intima of the aorta and of the heart, mode of formation, duration of the disease, and the cause of death. This extensive discussion included tables presenting data on 80 previously published cases of dissecting aneurism which he had collected.

He exhibited two specimens [94] to illustrate the condition of the heart after death from phthisis, one also with destruction of the supra-renal capsule without bronzing and the other showing a super-

numerary valve at the orifice of the pulmonary artery. And the final case was one with a large diaphragmatic hernia, where he gave a minute discussion of the literature on the subject and the cases previously reported.[96]

Session of 1863-64: A malformed heart [96] from a nine day old infant was exhibited by Peacock, in which the orifice of the pulmonary artery was obliterated and the foramen ovale and ductus arteriosus were open. A specimen,[97] sent to him for exhibition to the Society by Mr. C. Williams, resident medical officer of the Norfolk and Norwich Hospital, was a dissecting aneurism of the transverse and descending portions of the arch of the aorta. Another specimen, from a 32 year old female seen in consultation with Mr. Hacon of Hackney, was a portion of invaginated intestine which was passed by rectum and the patient recovered.[98] The intestine passed measured about 35 inches in length, or, including the ends which thinned off and were ragged, it was at least 40 inches long. The canal was laid open for two or three inches at each end, and in one or two places for a short distance elsewhere; but with these exceptions the caliber of the bowel was entire. Finally, with Mr. J. Wale Hicks, he showed specimens [99] of hydatids in the liver, spleen, right kidney, omentum, lungs and heart from an 18 year old sailor.

Session of 1864-65: On January 3, 1865 Peacock was elected the eleventh president by the members of the Society. Only on three occasions did he exhibit cases. One consisted of the lungs of a 55 year old Cornish miner who had worked in different tin and copper mines in Cornwall for close to 40 years but no siliceous particles were found in them on careful analysis.[100] Another was the heart of a patient who had a rheumatic pancarditis, a fleshy column of the diseased mitral valve having ruptured during violent vomiting.[101] And then two cases of cancerous deposits in the heart, one from an 18 year old male and the other from a 19 year old female, followed by a full discussion and extensive tables listing data on 46 previously reported cases.[102]

Session of 1865-66: According to a precedent, the members of the Society re-elected him president on January 2, 1866. If the number of cases exhibited and the size of the transactions for the

year may be taken as a criterion of his standing among the members, then one might suggest that Peacock was at the peak of his career. For in this session the number of specimens doubled over previous years, and the number of pages in the transactions increased from 250 to 500, an exceedingly large octavo volume for a small society.

The most important specimen exhibited by Peacock was a malformation of the heart,[103] which consisted of a contracted infundibular portion of the right ventricle and a deficiency in the ventricular septum with the aorta arising chiefly from the right ventricle, from a nine year old boy who had been cyanotic since birth. The specimen was sent to him by Mr. Roper of Islington. With Dr. J. Wale Hicks, he exhibited a benign stricture and ulcer of the esophagus,[104] and a benign stricture of the sigmoid flexure of the colon.[105] The final specimen he exhibited was the healed intestine of a 21 year old female who had typhoid fever and died on the 81st day of malnutrition.[106]

Session of 1866-67: In this session Peacock was again elected second vice-president, and showed three specimens. For Dr. Thurnam [107] he exhibited a brain with diseased frontal lobes, especially the left, from a 31 year old female who had suffered a right hemiplegia, loss of speech, etc. He exhibited only one heart, a rheumatic pancarditis with destruction of the chordae tendineae of the mitral valve.[108] And finally, an ulcerated appendix with an abscess in the cellular tissue taken from a 17 year old female whom he saw in consultation shortly before her death due to generalized peritonitis.[109]

Session of 1867-68: In 20 years the Society had grown tremendously and its transactions were sent to all parts of the medical world. Peacock presented a number of specimens, an aneurism of the aorta which had pressed on the pneumogastric and phrenic nerves; [110] an aneurism of the ascending aorta which had pressed upon the base of the right ventricle and opened into the origin of the pulmonary artery.[111] The latter case was followed by 14 pages of remarks on the communications of the sacs of cardiac cavities and adjacent vessels with an extended table of 33 such cases. It was published as a separate article in 1868.[112]

Dr. W. S. Church reported a case of ulceration and disorganiza-

tion of the aortic valve, a clot having been adherent to the area. At another meeting a month later, Peacock and Dr. Wilson Fox, having examined the specimen presented by Church, agreed with his opinion that the fibrinous deposit on the aortic valve was one which had formed during life by adhesion to the disorganized structure of the valve.[113]

Another case, termed endocarditis leading to partial destruction of two of the aortic valves and a perforation at the base of the mitral valve, also had an ulcerative perforation into the cavity of the left auricle.[114] There was the case of a 23 year old male with symptoms of short duration and sudden death, who had a very great contraction of the aortic orifice from disease of the valves.[115] For Dr. Hooper, Peacock exhibited a case of rupture of the heart from which the history was unusually interesting. This patient had frequent small attacks of precordial pain for weeks, then a severe attack for two days, and sudden death. At autopsy the coronary arteries were hard and the left ventricle was ruptured.[116] The last case exhibited by Peacock at this session was a specimen from a 23 year old male, " strumous " pyelitis and tubercle in the prostate, testis, and lungs, with a lumbar abscess from disease of the vertebrae.[117]

Session of 1868-69: During this session he exhibited only two specimens, both malformations of the heart. One had an atresia of the orifice of the pulmonary artery, the aorta communicating with both ventricles;[118] this 13 year old girl had been a patient of Dr. S. Sanders Stephens. Peacock made extensive remarks on such cases and added a table of eight cases of atresia of the pulmonary artery with complete ventricular septum and 26 cases of atresia of the pulmonary artery with imperfect ventricular septums. The second case was somewhat similar, an 8½ year old male patient of Mr. G. Gaskoin, who had a contraction or stenosis of the pulmonary orifice with the aorta arising from both ventricles.[119]

Session of 1869-70: 33 year old Thomas Clifford Allbutt, who had invented the present short form of clinical thermometer in 1867, became a member of the Society in 1870. There were an increasing number of specimens exhibited, among them six by Peacock. One, from an 8 year old boy, sent to him by Dr. Griffiths of Swindon, had a contracted pulmonary orifice with the aorta arising equally

from both ventricles.[120] Dr. Lanchester of Croydon sent him a specimen from a 2½ year old boy, which had been obtained by Dr. Creswell of South Norwood; it revealed a greatly contracted pulmonic orifice with the aorta arising from the right ventricle but communicating with the left by an aperture in the septum.[121] A third specimen, from a 15 year old female, the case occurring in the practice of Dr. Woodhouse and Mr. Harrison of Reading who sent the preparation to the museum of the Berkshire Hospital from which it was forwarded for exhibition to the Society by Mr. Royds, the resident medical officer, showed a nearly complete separation between the sinus and infundibular portion of the right ventricle, the aorta arising from both ventricles.[122]

On May 3, 1870, with Dr. Bristowe, he reported on Dr. Payne's case, exhibited at a previous meeting, of peculiar fibrous structures in the left ventricle of the heart which were thought to be of a congenital nature, but Peacock and Bristowe decided that they were not due to imperfect supplementary valves or to any other congenital deformity.[123] Other specimens exhibited by him were an aneurism of the arch of the aorta which caused pressure on the left recurrent nerve and showed an irregular origin of the large vessels;[124] a chronic ulcer of the stomach in a 20 year old female which caused death by perforating into the splenic artery;[125] and a perforated appendix vermiformis, the patient having been seen in consultation with Mr. Sargeant of Comberwell.[126]

Session of 1870-71: Peacock exhibited only two cases,[127] both malformations of the heart, at this entire session. The first was from a two year old boy who died of cancrum oris; findings were an entire obliteration or atresia of the orifice and trunk of the pulmonary artery and an opening in the ventricular septum. The second specimen was a condition which he stated that he had not previously seen nor read about in the literature. The heart showed a great contraction or stenosis of the pulmonary artery, a defect in the ventricular septum, and the aorta arising equally from the two cavities. There was no ductus arteriosus, but that vessel was replaced by two small branches connected with the aorta. Although this patient had been cyanotic during life, she lived to the age of 17 years.

Session of 1871-72: A variety of cases were exhibited by Peacock during this session. The first [128] was a case of obstruction by coagulum of the cerebral vessels with paralysis; the second,[129] extensive mitral and aortic valvular disease of known 13 years duration in a 17 year old male and thought to be congenital because of the long duration. The third [130] was a similar case in a 20 year old male, but of much shorter duration. The fourth [131] was from a 28 year old male, fatal constipation from excessive dilatation of the colon which measured six to eight inches in diameter at autopsy. The last [132] was a case of intra-thoracic tumor causing effusion into the right pleural cavity, obstruction of the descending cava and pressure on the recurrent nerves with involvement of the heart. The tumor was classed as of lymphatic origin, called lymphoma or lymphadenoma.

Session of 1872-73: Again the specimens exhibited by Peacock were of a large variety. One was a moulded coagula after hemoptysis from a patient who died of pulmonary tuberculosis.[133] Mr. Hacon of Hackney sent him a heart [134] with hydatid cysts imbedded in its walls. A third [135] was a heart with diseased aortic and mitral valves, embolism of the middle cerebral artery the cause of death, in which there were congenitally malformed aortic valves. From a 19 year old female,[136] seen in consultation with Mr. Esquire Dukes of Canonbury, he exhibited an intussusception of the upper part of the small intestine. And from a 53 year old male he exhibited a nearly complete obstruction of the portal and splenic veins with atrophy of the liver.[137]

Session of 1873-74: 522 members belonged to the Society by the 26th year of its existence, and Peacock exhibited four specimens before these large gatherings. An unusually large aneurism of the descending aorta which had formed a tumor in the left dorsal region; [138] a dissecting aneurism of the aorta from a 61 year old male; [139] a malformed heart, atresia of the pulmonary artery with the aorta arising from the right ventricle and the pulmonary circulation maintained through the ductus arteriosus. The latter specimen,[140] from a one year old infant, was sent to him by Mr. J. P. Purvis of Greenwich, the case having occurred in the practice of

Dr. Purvis of Blackheath. The final specimen [141] was a perforation of the bowel and fatal peritonitis in a 17 year old male, probably on the basis of typhoid fever but only the one ulcer was found in the alimentary canal.

Session of 1874-75: Peacock exhibited only two specimens at this session, an aneurism of the aorta opening into the left bronchus,[142] and a supra-renal capsular disease with bronzing of the skin.[143] Interesting was the fact that the Society held an extended forum on the "Germ Theory of Disease," the first of its kind in London. Twelve men discussed the entire theory and what they said covered a total of 90 printed pages in the transactions.

Session of 1875-76: The members of the Society were presented with a copy of the index to the transactions from volume 16 to 25 inclusive (1864-1876), through the generosity of Peacock who paid for all the work attached to the indexing, publishing, and distributing. Five specimens were exhibited by him during the session. One [144] was a case of aortic valvular disease, probably originating in a malformed valve; another [145] included two aneurisms, one of the innominate artery and one of the aorta, the latter having opened into the trachea; and a third [146] was a malformation of the heart, stenosis at the commencement of the conus arteriosus of the right ventricle and at the origin of the pulmonary artery with an aperture in the ventricular septum and the aorta arising partly from the right side. A fourth specimen [147] was an ulceration of the stomach from sulphuric acid taken by mistake, the patient having survived three weeks. And the last one was from a 34 year old female, suprarenal disease with bronzing of the skin.[148]

Session of 1876-77: Only one specimen was exhibited by Peacock, on October 17, 1876, that of a medullary sarcoma of the branchial glands and lung,[149] because the attack of left hemiplegia in February, 1877 laid him up for months.

Session of 1877-78: The membership of the Society reached 601 and Peacock exhibited three specimens, the first on May 21, 1878. One was of the "Millstone-Makers' Disease," demonstrating the siliceous matter found in the lungs of a 29 year old male;[150] portions of the indurated lung were subjected to analysis in the chemical

laboratory of St. Thomas's Hospital and were found to contain 0.406% of silex. He also exhibited the malformed heart [151] of a ten year old female, with a large aperture in the auricular septum and the foramen ovale closed. The third specimen [152] was an aneurism of the arch of the aorta which opened externally.

Session of 1878-79: Jonathan Hutchinson, who had joined the Society 27 years before at the age of 24, was elected president on January 7, 1879. And for the first time since its organization an American became an honorary member. He was Dr. Samuel D. Gross of Philadelphia. Peacock exhibited only two specimens at this session (a case of stenosis of the pulmonary artery from disease of the valves in a 13 year old boy,[153] and disease of the aortic valves originating in a congenital defect in a 19 year old female).[154]

Session of 1879-80: He exhibited three specimens. For Thomas Fisher of Great Eccleston, a case of a ruptured right ventricle of the heart in a 25 year old male who suffered a blow in the epigastrium while drunk; [155] with T. Barlow, the malformed heart of a three year old, showing a stenosis of the pulmonary artery and with the aorta arising from both ventricles; [156] and with W. Cash Reed, another malformed heart which had an absent pulmonary artery and a ventricular septal defect in a 13 month old infant.[157]

Session of 1880-81: On November 16, 1880 he exhibited the malformed heart of a six year old boy which showed great constriction or stenosis of the orifice of the pulmonary artery, the aorta arising from both ventricles and with defects in the fold of the foramen ovale. He cited ten such cases which had survived over the age of 20, the oldest up to 54 years of age.[158]

Session of 1881-82: On December 21, 1881, before 637 members, Peacock exhibited his final specimen in the 35 years he was associated with the Society. It was a case of transposition of the aorta and pulmonary artery in a seven month old infant, the specimen having been sent to him by Dr. Ashby of Owens College, Manchester.[159] Thus endeth the years of a great man.

V. Peacock's "Malformations of the Human Heart"

His outstanding work and the basis for setting him apart for special consideration lies in the two editions of his great work, the treatise on the "Malformations of the Human Heart."[160] Congenital cardiac malformations had first been observed by de Senac, on absence of the interventricular septum in 1749, and by Morgagni, on pulmonary stenosis in 1761. Peacock was in the prime of life, at 46, when he wrote the book, and considering what has been learned about his exacting nature and interest in statistics, it is surprising to go through the treatise and not only be able to read it with interest but be reluctant to lay it aside. In 143 pages, the first edition, he clearly explained the various examples of congenital heart disease and attempted to simplify the entire understanding as to the mode of formation and course of the blood stream in such cases. In the preface, written in October, 1858, Peacock stated the issue fully:

"Several examples of malformations of the heart having fallen under my notice, I have been induced for several years to pay special attention to this branch of medical science; and in 1854, shortly after an interesting case of malformation had occurred in St. Thomas's Hospital, I delivered a series of lectures on the subject to the students of that medical school. These lectures were subsequently published in the 'Medical Times and Gazette': together with several cases which have been at various times contributed to different medical societies and journals, are now reprinted, after the whole has been carefully revised and considerably extended."

He mentioned that the subject has attracted considerable attention in the profession, and that longer or shorter notices of the chief varieties of malformation were contained in the different works on morbid anatomy, and in the systematic treatises on cardiac affections by Burns,[161] Corvisart,[162] Bertin,[163] Laennec,[164] Bouillaud,[165] and Hope.[166] That they were the subject of a special essay by Farre,[167] and of shorter memoirs by Paget,[168] Williams,[169] Todd,[170] Joy,[171] Craigie,[172] Haase,[173] Meckel,[174] Hein,[175] Louis,[176] and Gintrac;[177] and more recently in graduation theses by Deguise[178] and Pize,[179] and in a series of papers by Chevers.[180]

" In this essay," Peacock concluded the preface, " It had been my aim to present the subject in a practical point of view, and I have therefore made no allusion to those forms of defect in the development of the heart which are incompatible with the existence of extra-uterine life. I have also endeavoured to apportion the space devoted to the descriptions of the various malformations, to the relative frequency and importance of the several forms, and it will be found that some of them have been treated differently and at greater length than by former writers. The medical periodicals, especially of France and England, abound in cases of malformation. I have, however, not thought it desirable to quote many of these at length, but have preferred to allude concisely to those which formed the earliest published examples of each form of defect, or which presented some rare and remarkable deviation, and have generally contented myself with referring to the periodicals and other publications in which the more recent or ordinary cases are reported."

In the front of the book are eight plates with 27 figures on them. Plate 1 illustrates the seat and form of apertures in the septum of the ventricles. Plate 2, obstruction at the orifice of the pulmonary artery and defect in the ventricular septum. Plate 3, an obstruction at the orifice of the pulmonary artery and an open foramen ovale. Plate 4, obstruction and obliteration of the orifice of the pulmonary artery. Plate 5, open ductus arteriosus and a supernumerary septum in the right ventricle. Plate 6, a supernumerary septum in the right ventricle with an open foramen ovale. Plate 7, defects in the number of semilunar valves. And Plate 8, excessive number of semilunar valves.

The first chapter consists of the misplacements of the heart. Transposition is mentioned, most commonly dextrocardia, and he cites many cases of all types, but states that he himself had no opportunity of examining any case of that kind after death. Under exposition, where the heart is located partly or entirely outside of the thoracic cavity, he described three types; the ectopia pectoralis cordis, the ectopia cordis ventralis where the heart extrudes through the diaphragm and not externally or where it forms an external tumor, and the ectopia cordis cephalica where the heart lies in front of the neck.

Deficiency of the pericardium received short notice, for he mentioned that if the heart is much displaced the pericardium is generally lacking; but it may occupy the natural position and be well formed and the pericardium be missing. He considered true congenital absence of the pericardium a very rare occurrence.

Under the malformations of the heart he took up the greater portion of the book in the third chapter. First were the malformations dependent on the arrest of development at an early period of foetal life, such as the biloculate heart, and he cited many cases. Concerning the triloculate heart, he said:

"The auricular sinuses are separated by a more or less complete septum, and there are generally two auriculo-ventricular apertures; while the ventricle is either wholly undivided or presents a very rudimentary septum. The arteries which are given off are usually two in number, an aorta and pulmonary artery. This kind of defect, though very rare, is of more frequent occurrence than the biloculate heart."

With the heart consisting of the four cavities, one or both of the septa may be imperfect. He stated that when the interventricular septum is only partially defective, the imperfection most generally occurs at the base, where, during foetal life, the division of the cavities is least affected, but the deficiencies in the septum are not confined to that situation. Peacock felt that there can be little difficulty, generally, in deciding as to the congenital or accidental origin of the apertures in any given instance; for, in a large proportion of cases, the existence of other irregularities will afford unmistakable evidence; and, in others, the triangular or rounded form of the openings and their smooth and polished edges, will indicate their nature. It must also be borne in mind, he continued, that when the edges of the openings are rough and irregular from fibrinous deposits, affording evidences of endocarditis, this does not alone show that the apertures are the result of disease; for such changes constantly accompany defects, unquestionably of congenital origin. He cited and re-stated the case of the "Holmes Heart" (of Montreal) where the two auricles both opened into the left ventricle and the right ventricle had no communication with the right auricle, but gave origin to the pulmonary artery and communicated with the left ventricle by an aperture in the septum.

Under the heading of "Defect in the inter-ventricular septum, aorta arising in part from the right ventricle, and obstruction at the pulmonic orifice," Peacock discussed many case reports previously published. There are cases of open foramen ovale, open inter-ventricular septal defect, right-sided aorta, and hypertrophy of the right ventricle. He felt that the hypertrophy of the right ventricle in these cases was due to causes precisely similar to those which occasion hypertrophy in either ventricle in after life; the increased growth which is consequent on the powerful muscular efforts to overcome the obstruction occasioned by the contracted or rigid state of the pulmonic orifice, or to maintain the circulation in the systemic, as well as in the pulmonic vessels. Although he made no mention of pulmonic insufficiency in these cases with the four defects, he described the cardiac syndrome which later became known as the Tetralogy of Fallot.[181]

Some unusual cases mentioned in this section are, first, that of a 2½ year old boy seen in June, 1846 who had a pulmonary stenosis and a defect in the ventricular septum; and second, that of a 6½ year old boy, the heart specimen having been sent to him by Mr. Marshall of Mitcham in whose practice the case occurred. In both cases Peacock related that the mothers were frightened during pregnancy, the first in the seventh month when she saw a child killed and never recovered from the shock she sustained; the second mother in the fifth month, but there is no mention of what frightened her. In the second case mentioned, the heart was of large size and the right ventricle, especially, was hypertrophied and dilated. Pulmonary valves greatly contracted and united into a hollow cyinder, the passage from the ventricle into the vessel being three or four inches long. The septum of the ventricles was deficient at the base, over a large space, so that the aorta arose from both ventricles; and the foramen ovale was open as to admit of the passage of the forefinger.

In a third case he again stated the mother's story; that when she was pregnant with this child, four or five months before her confinement, she was greatly alarmed by her husband, who was insane, standing over her for two hours with a loaded pistol. Peacock gave a fine description of the finding in this 19 year old girl. When she was admitted into St. Thomas's Hospital, "she presented the usual

symptoms of malformation of the heart, with signs of obstruction at the right side, and marked cyanosis. Her cheeks were livid, and the colour did not return quickly into them when they were blanched by compression. The conjunctivae were injected; and the lips, gums, and interior of the mouth were of a dark purple hue, and the gums spongy and tender. The nails were much arched and dark coloured, and the extremities of the fingers were somewhat bulbous. The chest was prominent in front and flat at the sides. There was very obvious pulsation in the carotids, and the jugulars were distended, but did not pulsate. She suffered from great difficulty of breathing and sense of suffocation, and was often incapable of lying down in bed." He cited another case, the heart of a child 17 months old, which presented similar malformations to those in this last case. And also the case of a seven month child who had two small apertures in the ventricular septum with contraction of the right A-V aperture.

Peacock listed 30 cases with references where the orifice of the pulmonary artery was contracted or the vessel small and rigid with a ventricular septal defect and an open foramen ovale; six cases with references of a contracted pulmonary artery orifice and an imperfect ventricular septum, state of the foramen ovale not reported, were listed. Also he listed 11 cases and references where the pulmonary orifice was contracted and the ventricular septum was imperfect but the foramen ovale was closed.

Under the heading of "Obliteration of the pulmonary orifice," Peacock stated that in some cases the obliteration is confined to the orifice of the pulmonary artery and is caused by the union of the valves, forming a kind of septum or diaphragm, stretched across the opening, and entirely separating the cavity of the vessel from that of the ventricle, while the trunk of the artery remains pervious. In other instances a larger or smaller portion of the vessel, commencing at its origin from the ventricle and extending towards the ductus arteriosus, is impervious and converted into a ligamentous cord. When the whole of the trunk is obliterated, he continued, the pulmonary branches appear to be simply the divisions of continuations of the ductus arteriosus. If the obliteration occurs while the growth of the septum is in progress, the right ventricle becomes

large and powerful, and the aorta derives its chief blood supply from that cavity, while the left auricle and ventricle are proportionately small. If, on the contrary, he concluded, the obliteration occurs after the septum of the ventricles is completed, the right ventricle and right A-V aperture become very much diminished in size, and the left cavities are unusually large and powerful.

Again, in the case report of a ten month old infant seen on November 15, 1847, where there was an obliteration of the trunk of the pulmonary artery, the aorta arising chiefly from the right ventricle and giving off pulmonary branches through the ductus arteriosus, Peacock related that the father was a healthy man but the mother was much out of health; she stated that when pregnant with this child, she was greatly alarmed by seeing a man who was dying of asthma. In addition to the cases of obliteration of the orifice or trunk of the pulmonary artery quoted above, he listed references to two cases with the ventricular septum entire and 12 cases with the septum of the ventricles imperfect.

When a supernumerary septum is developed in the right ventricle, Peacock stated, it is at the point of union of the sinus and infundibular portion that it covers; and the partition of the cavity of the ventricle is by part due to hypertrophy of the muscular columns which usually occupy this situation, and partly to the thickening and induration of the lining membrane. He continued:

"The opening by which portion of the ventricle communicate often consists of a firm fibro-cartilaginous ring, not unfrequently displaying old or recent deposits of lymph upon its edges. In form it is usually round and oval, and it may be so small as only to admit the passage of a crow or a goose-quill, or it may readily allow the finger being pushed through. The effects upon the general form of the ventricle vary with the degree of obstruction which the septum occasions, the sinus of the ventricle being large and thick (and especially so when the septum cordis is also deficient, so that the aorta has a communication with the right ventricle), while the infundibular portion (if there be no other source of obstruction at the orifice of the pulmonary artery), becomes atrophied, and is reduced to a very small cavity."

Two such cases were described, one a 15 year old boy with a

supernumerary septum in the right ventricle, a contracted pulmonary artery orifice with the aorta arising above an aperture in the ventricular septum; death was due to an obstruction of the trunk and branches of the pulmonary artery. The second was the case of a five year old girl with a supernumerary septum in the right ventricle and the heart otherwise well formed.

Peacock then considered the malformations preventing the heart from undergoing the changes which should ensue after birth. In some cases, he pointed out, the heart has been found incapable of maintaining extra-uterine life, in consequence of the faulty development caused by closure of the foramen ovale or the ductus arteriosus in the foetus. The ductus arteriosus may also become obliterated at different periods of foetal life. At least it is by no means unusual in malformed hearts, for no remains of the duct to be found, and this may be referred to that portion of the branchial arch having become abortive at an early period. Thus the duct may be absent, he concluded, when the septum of the ventricles is very imperfect, though two distinct vessels arise from the cavity; and it may also not exist in cases where the development of the organ is more advanced, the septum of the ventricles being only slightly defective. He described a case, the preparation of which was sent to him by Dr. Bentley, in which there was smallness of the pulmonary orifice and artery, the ductus arteriosus absent, a defect in the ventricular septum, and an open foramen ovale. He also cited cases of absence of the right A-V aperture, of obliteration or absence of the left A-V aperture, and obliteration of the aortic orifice.

When the foramen ovale remains open, he stated, it may be under the following circumstances:

1. The opening may be unusually large, and the valves entirely wanting;

2. The foramen may be larger than usual, or of the natural size; but the folds may be imperfectly developed, so as to be too small to close the opening;

3. The opening may be natural, and the valve may have attained the full size; but the membrane may be very defective, being perforated by one or more larger or smaller apertures;

4. The foramen may be of natural size; the valve may be fully developed, so as to be capable not only of covering the orifice, but of reaching some distance above its edge; and the membrane may be entire; but the changes which should occur shortly after birth may not have taken place. The cornua of the valve may retain their length and be widely apart, and the fold may hang loosely across the orifice, so as to offer but little impediment to the continued passage of the blood from the right into the left auricle.

After completely discussing the theories on the closure of the foramen ovale after birth, Peacock stated that on examining the heart in young children, at different periods after birth, it will be found that the obliteration of the passage is effected by:

1. The shortening of the cornua, and the drawing up of the fold of the valve considerably above the edge of the foramen;

2. The approximation of the cornua, so that the width of the upper edge of the valve is greatly reduced; and,

3. By the diminution of the opening itself.

Concerning the patent ductus arteriosus, Peacock stated that when it remains open it may be found of larger size than is usual at the time of birth, as in the cases before mentioned in which the foramen ovale was obliterated during intra-uterine life. It may remain its natural size, as when the aorta beyond the left subclavian artery is greatly obstructed or impervious. It may be reduced to a narrow canal only capable of admitting a probe, a crow-quill, or a small goose-quill. Or lastly, it may be found to present a sacculated dilatation. In some cases, also, he concluded, the duct and foramen ovale remain open without there being any cause to which the defects can be assigned, and it has been thought that this is more likely to be the case when the child is born before the full period, and is placed in unfavourable hygienic circumstances during early infancy.

The third portion of the treatise covered the malformations which do not interfere with the functions of the heart, but lay the foundation of disease in after life. Most important were the irregularities of the valves, such as a deficiency in the number of semilunar valves of which there may be three varieties. There may be only one curtain, stretched across the orifice or protruded forwards in the course

of the vessel so as to assume a funnel shape. More frequently, however, there are two segments, and the deficiency is apparently due to the adhesion of the contiguous sides of two of the original three valves and the atrophy of the corresponding angle of attachment. The least frequent form of defect is that in which there are two large segments, with a small rudimentary valve interposed between them. He then described the forms of defect which do not necessarily interfere with the functions of the heart but, in a considerable number of cases, laid the foundation of disease in after life. Peacock continued:

1. When the whole of the segments are fused together or when two only are united, the valves may not unfrequently become the seat of chronic inflammation, by which they are rendered thick and unyielding and which often goes on to the production of extensive ossification; thus inducing, first obstruction of the flow of the blood from the ventricle into the aorta, and then incompetency, by which the blood which has entered the aorta is allowed to regurgitate into the ventricle.

2. When two of the valves are united, the line of fusion, or of former separation, is less readily extensible than the other parts of the united fold; and thus that portion does not expand with the progress of growth so as to accommodate itself to the natural enlargement of the orifice, but is as it were held back, and leaves an open space between its edge and the other segment, by which the blood regurgitates from the aorta into the ventricle.

3. The tendency to regurgitation in the latter class of cases, and also in the instances in which the fold does not expand equally in all parts, is increased by the want of support to the edge of the larger curtain which should be afforded by the corresponding angle of attachment. The edge of the valve thus becomes retroverted, and regurgitation from the aorta into the ventricle is either aggravated or occasioned. In the *Edinburgh Monthly Journal of Medical Science*, for 1853, he reported several cases of disease of the aortic valves which originated in one or the other of these ways.

As to the excess in the number of segments of the semilunar valves, Peacock stated that of 41 cases of irregularity of these valves

which he examined and reported upon at the Pathological Society of 1851, nine only exhibited an excess in the number of segments, and in eight of them the irregularity existed at the pulmonic orifice. The material on malformations of the tricuspid and mitral valves he quoted from Burns's book of 1809.[161]

The fourth major portion of the treatise considered malformations consisting in the irregular development of the primary vessels. He cited the case of an eight month old boy with a transposed aorta and pulmonary artery in which the latter arose posteriorly from the left, and the aorta anteriorly from the right ventricle. On the question of the descending aorta being given off from the pulmonary artery, he stated that the most frequent and important irregularity is that in which the aorta, after having given off the vessels to the head and upper extremities, becomes greatly obliterated or contracted, or is entirely wanting; so that the inferior parts of the body derive their supply of blood through the ductus arteriosus and pulmonary artery. In 1847 he exhibited and described at the Pathological Society a preparation displaying this irregularity.

However, of the deviations from the natural arrangement of the large venous trunks, the most frequent are the existence of two ascending or descending cavae; or two, instead of four pulmonary veins, or the irregular insertion of these vessels. Thus the pulmonary veins may enter the right, and the systemic veins the left auricle. The two sets of veins may communicate with the same cavity, or the auricle may be deficient, and the veins may enter the ventricles directly; but these irregularities are not of sufficient importance to require further notice.

In the final portion of the treatise Peacock considered the mode of formation, symptoms, effects, diagnosis and medical management of the malformations of the heart. The malformations of the first class, he clearly stated, are more or less closely allied, and depend on the process of development being arrested at different periods of foetal life; so that the organ retains one or the other of the forms which are proper to it at the different periods of growth.

He presented a complete discussion of all the theories on the mode of formation and believed that the " foetus in utero is liable to diseases precisely similar in their nature and results, to those which

affect the child after birth, and there can be no doubt that both the peri- and endo-cardium are not unfrequently the seat of inflammation during foetal life."

The second form of malformation, that in which the vessels are misplaced or unusually distributed, must be ascribed to the improper division of the bulbus arteriosus, and to the irregular development of the branchial arches.

Concerning the occurrence of accidents and strong impressions upon the mind of the mother, Peacock stated "these are also supposed to conduce to the irregular development of the offspring, and in many cases such causes appear to have operated. In several instances which have fallen under my notice, the mothers of the children labouring under malformations of the heart, have assigned the defect in the children to strong mental impressions or shocks which they have sustained during pregnancy; and there seems reason to believe that such causes, by deranging the foetal circulation, might produce the effects."

The symptoms by which malformations of the heart are characterized are referable to derangement of the circulation and respiratory functions, and to the secondary disorders of the various viscera so induced. He continued, "A child, labouring under serious malformation of the heart, generally presents at birth a livid colour. The respiration is imperfect and difficult, and the heart is observed to beat violently. There may, however, be no unnatural appearance whatsoever at the period of birth, and the symptoms may only present themselves at the expiration of some months or even years. When once the signs of obstructed circulation have been manifested, they may either be permanent, or they may soon subside and the child may acquire a healthy appearance and thrive naturally. In either case, however, paroxysms generally occur, in which the breathing becomes extremely difficult, rapid or gasping; the surface of the body, more especially the face and extremities, acquires a dark, in some cases, almost a black hue; and the infant indicates by its cries great distress. Not unfrequently it becomes convulsed, and when exhausted by its struggles, the symptoms subside, and disappear more or less completely. The paroxysms recur at longer or shorter intervals, and with varying degrees of severity, according to the

extent to which the deviation from the natural conformation of the heart predisposes to embarrassment of the circulation. If the child survives the period of infancy the symptoms continue similar in character. From the defective respiration the power of generating heat is very feeble, the extremities are cold, and there is peculiar susceptibility to the changes of temperature, so that the child is liable, on the slightest exposure to suffer from bronchitic attacks."

The duration of life in persons labouring from different forms of malformation Peacock considered under the various alterations. In those cases in which there is moderate contraction of the orifice or trunk of the pulmonary artery, while the heart is otherwise well formed, the increased power of the right ventricle may so overcome the difficulty in transmitting the blood through the lungs, as to maintain the balance of the circulation, and allow a considerable amount of health and vigour to be enjoyed for many years. When the foramen ovale is open, the obstruction at the pulmonary orifice is generally greater than in the class of cases just mentioned, and the duration of life is therefore less. Where, with contraction of the pulmonary orifice, the septum cordis is imperfect, so that the aorta has a more or less direct communication with the right ventricle at an early period of foetal existence, the duration of life is still further curtailed.

Continuing on the prognosis, Peacock stated that where the pulmonary artery is entirely impervious, the usual duration of life is still less than in the latter class of malformation. And when the arrest of development is still more complete, so that when the heart consists of only one ventricle with one or two auricles, the period for which the patients survive is usually very limited; but it is very remarkable that four persons who presented this condition attained the ages of 11, 16, 23, and 24 years. Where an abnormal septum exists in the right ventricle, the duration of life bears reference to the degree of obstruction which is occasioned, and the effects correspond very closely with those which result from an impediment at the pulmonic orifice. The transposition of the main arteries appear to be a form of malformation which is incompatible with the maintenance of life for any considerable period after birth. The duration of life in the form of malformation in which the aorta distal to the

left subclavian artery is contracted or impervious, and the descending aorta is wholly or chiefly supplied through the pulmonary artery, is generally very limited. When the heart is well formed, its malposition within the thorax is not necessarily productive of such serious inconvenience as to interfere wit. the duration of life. Finally, the absence of the pericardium does not appear to affect the functions of the heart or to interfere with the duration of life, though the organ, under such circumstances, very generally contracted adhesions to the adjacent parts.

Peacock stated that the causes of death in cases of malformation of the heart are as follows:

1. Cerebral disturbance, resulting from defective aeration of the blood and congestion of the brain;

2. Imperfect expansion, collapse and engorgement of the lungs;

3. Effusion into the cellular tissue and serous sacs from failure of the power of the heart, or recent disease superinduced on the original cardiac defect;

4. Exhaustion from the imperfect performance of the respiratory functions and the circulation of the blood in great part venous;

5. Other diseases predisposed to by the defective conformation of the heart; as apoplexy or paralysis from engorgement or softening of the brain, or extravasation of blood, etc.

He based the diagnosis of malformations of the heart on symptoms of palpitation, dyspnea, and more or less cyanosis, which existed since birth or shortly after, and evidences of obstructed circulation at the time of examination. In all cases, he added, the detection of the precise malformation must be a task of considerable difficulty, and in some instances entirely impracticable.

As to the medical treatment in cases of malformation of the heart, he felt it must consist of (1) hygienic management of the patient so as to maintain the circulation and give tone to the general system; (2) in the avoidance of the various causes which may aggravate the existing defects in the conformation of the heart, or give rise to secondary disease in other organs; and (3) in the

relief of urgent symptoms when they arise. In the final paragraph of his outstanding treatise, Peacock concluded:

"By the course of management which has been mentioned in the slighter forms of malformation, life may occasionally be prolonged for several years, and in some instances a considerable amount of constitutional vigour may be enjoyed; but such cases are exceptional and only occur under the most favorable circumstances. In the more serious deviations from the natural conformation of the heart, which constitute the majority of cases, the maintenance of life is unavoidably limited to a few days, weeks, or months, and the benefit to be derived from medicine is confined to affording some alleviation to the sufferings of the patient."

In 1866 a second edition of the "Malformations of the Human Heart" appeared,[182] carefully revised and brought up to date. This was a larger and better printed text of 204 pages and the plates were improved. An index of authors of cases quoted was even added. Apparently Peacock had received certain criticisms on the first edition, for in the preface of October, 1866, he mentioned the works of Friedberg [183] and Tiedemann,[184] which had been omitted in the earlier publication, and went on to say that the earlier writers on cardiac affections, Corvisart, Laennec, Burns, Bertin, etc., contented themselves with simply alluding to the different forms of defect with which they were acquainted; and even so recent a writer as Dr. Hope regarded them as "so irregular in their combinations as scarcely to admit of being classified on general principles."

VI. Other Contributions by Peacock

The earliest record of any publications by him were the statistical tables of the Royal Infirmary of Edinburgh for the year of 1842 [185] appended to the report of the managers of that institution for the year. The following year he again did the statistical tables and they were appended to the managers' report of 1843.[186] There also appeared an account of some experiments illustrative of the mode of formation of dissecting aneurisms,[187] after he reported cases of dissecting aneurism or that form of aneurismal affection in which the sac is situated between the coats of the vessel.[188]

Two more articles appeared in 1845, one on the coexistence of

granular disease of the kidneys with pulmonary consumption,[189] and the other a case report, in which the vena cava inferior was obstructed from the commencement of the common iliac veins and its cavity entirely obliterated between the entrance of the emulgent and hepatic veins.[190] In the following year appeared his article on the weights and dimensions of the heart in health and disease,[191] which was reprinted as a small booklet with additions in 1854.[192] At the same time his report on cases of partial aneurysm of the heart [193] appeared. And in 1847 he published a case of malformation of the heart in which death resulted from obstruction in the trunk of the pulmonary artery.[194]

In the next year, 1848, he published a treatise, his first, on influenza or epidemic catarrhal fever of 1847-48,[195] the material of which was originally delivered in the form of clinical lectures to the students at the Aldersgate Street Medical School. All patient records had been kept and maintained by himself, and he gave a very fine discourse on the entire subject, dividing it into simple catarrhal fever, catarrhal fever with pulmonary complications, and catarrhal fever with abdominal complications. He stressed particularly the gastro-intestinal modalities of influenza. His note in reference to a case of malformation of the heart [196] which he mentioned when reporting a previous case of the same nature [194] also appeared in this year.

Several years later he made some important contributions after publishing, in 1852, the vital statistics from the Royal Free Hospital.[197] His contributions to the pathology of the heart and the arteries,[198] covering the question of injury of the valves of the heart due to violent muscular exertion, was published. And in the next year an article on malformation of the aortic valves as a cause of death.[199]

His attention having been attracted to the prevalence of pulmonary disease among the French millstone-makers by the number who applied for treatment at St. Thomas's and the Victoria Park Hospitals, Peacock made inquiries at the shops to find out what might have caused them to come under observation. Investigations convinced him that the occupation predisposed to pulmonary affections. In 1860 [200] he published observations, cited cases, and after

considering fully all aspects of the problem he made certain preventative recommendations. Portions of the indurated lung tissue were subjected to ignition in the flame of a spirit-lamp; the white ash which remained dissolved to a great extent in hydrochloric acid, and partly with effervescence, but a portion was left which was seen under the microscope to consist of small angular transparent granules, exactly resembling the finer portions of the siliceous dust collected from one of the work-shops.

Another important contribution appeared in the same year, on contraction and obliteration of the aorta near the junction of the ductus arteriosus.[201] A very excellent article, citing all previously reported cases from 39 different sources. The condition is known to-day as coarctation of the aorta, infantile and adult types, for Peacock mentioned the dilated vessels in the neck and chest with notable beats even in the intercostal arteries, and the absence or greatly diminished pulsations in the vessels of the lower extremities as compared with those in the upper extremities.

When he was chosen to give the Croonian Lectures of the Royal College of Physicians for 1865,[202] Peacock dedicated the three lectures to the president, Dr. Thomas Watson. In the first lecture he considered the diseases originating in malformation, especially those due to defective development of arterial and A-V valves and the mode in which these give rise to obstruction or incompetency. All were illustrated by case reports which he had originally described in the *Pathological Transactions*. He stated that of 43 cases in which the aortic valves were diseased, either alone or in conjunction with the mitral valves, in 11 (25.5%) there was malformation of the valves, which probably laid the foundation of the subsequent disease. The second lecture covered the diseases originating in injuries and in alterations in the capacity of the orifices and cavities of the heart. He indicated that these injuries are generally the result of violent muscular effort and may occur in hearts previously sound; case reports were added to substantiate this and also described the symptoms which arise due to such injuries. There were also cases of injury of the valves in diseased hearts, alterations in the size of the cavities and apertures of the heart giving rise to maladjustment of the valves, and cardiac disease in miners. The frequency of these

different forms of disease as compared with the more common causes were listed as follows: of 26 cases of aortic valvular disease, 9 (34.6%) were due to malformation, 2 (7.4%) to injury, 6 (23%) to rheumatism, and 9 (34.6%) due to various other causes combined; of 17 cases of uncombined mitral disease, 11 (66.7%) were due to rheumatism, and 6 (25.2%) to other causes; and of 16 cases of combined aortic and mitral valvular disease, 2 (12.5%) were due to malformation, 10 (62.5%) to rheumatism, and 4 (25%) due to other causes.

"These results," he concluded, "correspond with those which have been arrived at by other observers, in showing the rarity of serious disease of the right side of the heart, either alone or in combination with disease of the left side, in cases in which the conformation of the heart is otherwise natural. Were, however, the instances of diseases in which there are serious deviations from the natural conformation, to be included in this calculation, it would seem that valvular disease on the right side, is, during foetal life, much more common than is here shown to be the case in after life."

In the third and final lecture, on the weight and dimensions of the healthy heart, and the changes which occur in the organ in different forms of valvular and other diseases, he stated that the heaviest heart to come to his attention was one weighing 1245 grams, from a 65 year old male who had expired suddenly. There was no valvular disease, and it was difficult to explain the tremendous size of the heart. He observed that in cases of simple hypertrophy, obstruction in the course of the aorta, and obstruction and regurgitant disease of the aortic valves, the heart attains its greatest increase in weight. He concluded the Croonian lectures with an optimistic note when he said:

"In cases of cardiac diseases, the changes which have already occurred it is beyond our power to remove, but we may nevertheless do much to promote the comfort and prolong the life of the patient. By a judicious system of diet regimen and medicine, we may prevent the occurrence of the various secondary infections, or relieve them when they arise; and we may so in many cases enable the patient to enjoy a large amount of health and vigour for many years, and in some instances probably for the full period of human life."

On October 9, 1868 Peacock read a paper on the statistical analysis of cases of acute and subacute rheumatism,[203] especially in reference to the proportion of cardiac complications, before the Clinical Society of London. Of 146 cases which he reported, 62 (42.4%) developed cardiac complications. His final paper appeared in 1871, a discussion on the prognosis in cases of valvular disease of the heart,[204] in which he listed the sources of danger as (1) failure of the muscular power of the heart, (2) congestion of the organs anterior to the seat of obstruction, and (3) thrombosis and embolism.

In summing up briefly, one might conclude that Peacock's most important contributions were on influenza, cardiac ailments, and diseases of metal miners, but the "Malformations of the Human Heart," his greatest contribution, will always stand out as the wedge which opened a closed door to the common understanding of congenital heart disease.

I am indebted to Dr. Irving S. Cutter who permitted me carte blanche use of the rare Peacock volumes in the Archibald Church Library of the Northwestern University Medical School.

BIBLIOGRAPHY

1. *Path. Trans. of London*, 1:9, 1846-48.
2. *Ibid.*, 1:25, 1846-48.
3. *Ibid.*, 1:34, 1846-48.
4. *Ibid.*, 1:34, 1846-48.
5. *Ibid.*, 1:44, 1846-48.
6. *Ibid.*, 1:58, 1846-48.
7. *Ibid.*, 1:61, 1846-48.
8. *Ibid.*, 1:63, 1846-48.
9. *Ibid.*, 1:70, 1846-48.
10. *Ibid.*, 1:113, 1846-48.
11. *Ibid.*, 1:200, 1846-48.
12. *Ibid.*, 1:205, 1846-48.
13. *Ibid.*, 1:222, 1846-48.
14. *Ibid.*, 1:227, 1846-48.
15. *Ibid.*, 1:237, 1846-48.
16. *Ibid.*, 1:240, 1846-48.
17. *Ibid.*, 1:253, 1846-48.
18. *Ibid.*, 1:255, 1846-48.
19. *Ibid.*, 1:284, 1846-48.
20. *Ibid.*, 2:37, 1848-50.
21. *Ibid.*, 2:42, 1848-50.
22. *Ibid.*, 2:48, 1848-50.
23. *Ibid.*, 2:49, 1848-50.
24. *Ibid.*, 2:56, 1848-50.
25. *Ibid.*, 2:60, 1848-50.
26. *Ibid.*, 2:72, 1848-50.
27. *Ibid.*, 3:71, 1850-52.
28. *Ibid.*, 3:75, 1850-52.
29. *Ibid.*, 3:76, 1850-52.
30. *Ibid.*, 3:285, 1850-52.
31. *Ibid.*, 3:286, 1850-52.
32. *Ibid.*, 3:287, 1850-52.
33. *Ibid.*, 3:289, 1850-52.
34. *Ibid.*, 3:291, 1850-52.
35. *Ibid.*, 3:297, 1850-52.

36. *Ibid.*, 4:7, 1852-3.
37. *Ibid.*, 4:85, 1852-3.
38. *Ibid.*, 4:87, 1852-3.
39. *Ibid.*, 4:196, 1852-3.
40. *Ibid.*, 5:21, 1853-4.
41. *Ibid.*, 5:41, 1853-4.
42. *Ibid.*, 5:64, 1853-4.
43. *Ibid.*, 5:67, 1853-4.
44. *Ibid.*, 5:78, 1853-4.
45. *Ibid.*, 5:96, 1853-4.
46. *Ibid.*, 5:102, 1853-4.
47. *Ibid.*, 6:117, 1854-5.
48. *Ibid.*, 6:119, 1854-5.
49. *Ibid.*, 6:155, 1854-5.
50. *Ibid.*, 6:372, 1854-5.
51. *Ibid.*, 7:54, 1855-6.
52. *Ibid.*, 7:80, 1855-6.
53. *Ibid.*, 7:88, 1855-6.
54. *Ibid.*, 7:92, 1855-6.
55. *Ibid.*, 7:111, 1855-6.
56. *Ibid.*, 7:263, 1855-6.
57. *Ibid.*, 8:64, 1856-7.
58. *Ibid.*, 8:127, 1856-7.
59. *Ibid.*, 8:130, 1856-7.
60. *Ibid.*, 8:333, 1856-7.
61. *Ibid.*, 8:337, 1856-7.
62. *Ibid.*, 9:53, 1857-8.
63. *Ibid.*, 9:61, 1857-8.
64. *Ibid.*, 9:65, 1857-8.
65. *Ibid.*, 9:184, 1857-8.
66. *Ibid.*, 10:15, 1858-9.
67. *Lond. &Edin. M. J. of M. Sc., 12*, 1852.
68. *Path. Trans. of London*, 10:92, 1858-9.
69. *Ibid.*, 10:107, 1858-9.
70. *Ibid.*, 10:108, 1858-9.
71. *Ibid.*, 10:142, 1858-9.
72. *Ibid.*, 10:143, 1858-9.
73. *Ibid.*, 10:154, 1858-9.
74. *Ibid.*, 11:40, 1859-60.
75. *Ibid.*, 11:43, 1859-60.
76. *Ibid.*, 11:68, 1859-60.
77. *Ibid.*, 11:278, 1859-60.
78. *Edinburgh M. J., 7*, 1847; also *London J. M., 1*, 1851.
79. *Path. Trans. of London*, 12:27, 1860-1.
80. *Ibid.*, 12:36, 1860-1.
81. *Ibid.*, 12:59, 1860-1.
82. *Ibid.*, 12:73, 1860-1.
83. *Ibid.*, 12:75, 1860-1.
84. *Ibid.*, 12:157, 1860-1.
85. *Ibid.*, 13:38, 1861-2.
86. *Ibid.*, 13:39, 1861-2.
87. *Ibid.*, 13:57, 1861-2.
88. *Ibid.*, 13:64, 1861-2.
89. *Ibid.*, 13:97, 1861-2.
90. *Ibid.*, 14:40, 1862-3.
91. *Ibid.*, 14:87, 1862-3.
92. *Edinburgh M. & S. J.*, 60:276, 1843.
93. *Lond. & Edin. M. J. of M. Sc., 9*, 1849.
94. *Path. Trans. of London*, 14:126, 1862-3.
95. *Ibid.*, 14:146, 1862-3.
96. *Ibid.*, 15:60, 1863-4.
97. *Ibid.*, 15:79, 1863-4.
98. *Ibid.*, 15:113, 1863-4.
99. *Ibid.*, 15:247, 1863-4.
100. *Ibid.*, 16:57, 1864-5.
101. *Ibid.*, 16:67, 1864-5.
102. *Ibid.*, 16:99, 1864-5.
103. *Ibid.*, 17:45, 1865-6.
104. *Ibid.*, 17:119, 1865-6.
105. *Ibid.*, 17:137, 1865-6.
106. *Ibid.*, 17:137, 1865-6.
107. *Ibid.*, 18:23, 1866-7.
108. *Ibid.*, 18:38, 1866-7.
109. *Ibid.*, 18:87, 1866-7.
110. *Ibid.*, 19:98, 1867-8.
111. *Ibid.*, 19:111, 1867-8.
112. Peacock, T. B.: *Aneurism, etc.*, London, J. Roche, 1868.
113. *Path. Trans. of London*, 19:146, 1867-8.
114. *Ibid.*, 19:161, 1867-8.
115. *Ibid.*, 19:163, 1867-8.
116. *Ibid.*, 19:186, 1867-8.
117. *Ibid.*, 19:262, 1867-8.
118. *Ibid.*, 20:61, 1868-9.
119. *Ibid.*, 20:87, 1868-9.
120. *Ibid.*, 21:78, 1869-70.
121. *Ibid.*, 21:79, 1869-70.
122. *Ibid.*, 21:83, 1869-70.
123. *Ibid.*, 21:105, 1869-70.
124. *Ibid.*, 21:134, 1869-70.

125. *Ibid.*, 21 : 166, 1869-70.
126. *Ibid.*, 21 : 182, 169-70.
127. *Ibid.*, 22 : 85, 1870-1.
128. *Ibid.*, 23 : 14, 1871-2.
129. *Ibid.*, 23 : 59, 1871-2.
130. *Ibid.*, 23 : 61, 1871-2.
131. *Ibid.*, 23 : 104, 1871-2.
132. *Ibid.*, 23 : 245, 1871-2.
133. *Ibid.*, 24 : 20, 1872-3.
134. *Ibid.*, 24 : 37, 1872-3.
135. *Ibid.*, 24 : 49, 1872-3.
136. *Ibid.*, 24 : 108, 1872-3.
137. *Ibid.*, 24 : 122, 1872-3.
138. *Ibid.*, 25 : 43, 1873-4.
139. *Ibid.*, 25 : 49, 1873-4.
140. *Ibid.*, 25 : 62, 1873-4.
141. *Ibid.*, 25 : 116, 1873-4.
142. *Ibid.*, 26 : 16, 1874-5.
143. *Ibid.*, 26 : 207, 1874-5.
144. *Ibid.*, 27 : 59, 1875-6.
145. *Ibid.*, 27 : 130, 1875-6.
146. *Ibid.*, 27 : 131, 1875-6.
147. *Ibid.*, 27 : 143, 1875-6.
148. *Ibid.*, 27 : 287, 1875-6.
149. *Ibid.*, 28 : 32, 1876-7.
150. *Ibid.*, 29 : 31, 1877-8.
151. *Ibid.*, 29 : 43, 1877-8.
152. *Ibid.*, 29 : 68, 1877-8.
153. *Ibid.*, 30 : 258, 1878-9.
154. *Ibid.*, 30 : 277, 1878-9.
155. *Ibid.*, 31 : 72, 1879-80.
156. *Ibid.*, 31 : 91, 1879-80.
157. *Ibid.*, 31 : 91, 1879-80.
158. *Ibid.*, 32 : 35, 1880-1.
159. *Ibid.*, 33 : 49, 1881-2.
160. Peacock, T. B., *On the Malformations of the Human Heart*, London, J. Churchill, 1858.
161. Burns, Allan, *Observations on Some of the Most Frequent and Important Diseases of the Heart*, Edinburgh, T. Bryce & C., 1809.
162. Corvisart, J., *Essai sur les maladies et les lesions organiques du coeur*, Migneret, 1806.
163. Bertin, R. J., *Treatise on the Diseases of the Heart* (translated from the French by C. W. Chauncy), Philadelphia, Carey, Lea, and Blanchard, 1833.
164. Laennec, R. T. H., *Traité de l'auscultation médiate*, Paris, J. S. Chaude, 1826.
165. Bouillaud, J. B. (Translated from the French edition of 1836 by J. Kitchen), Philadelphia, Haswell, Barrington & Haswell, 1837.
166. Hope, J., *A Treatise on the Diseases of the Heart, etc.*, London, W. Kidd, 1835, 2nd Edition.
167. *On Malformations of the Human Heart*, London, 1814.
168. "On the Congenital Malformations of the Human Heart," *Edinburgh M. & S. J.*, 36 : 263, 1831.
169. *Cyclopedia of Practical Medicine*, 3 : 65, 1834.
170. *Cyclopedia of Anatomy and Physiology*, 2 : 630, 1839.
171. *Library of Medicine*, 3 : 381, 1840.
172. "Case of Cyanosis or Blue Disease, etc.," *Edin. M. & S. J.*, 60, 1843.
173. *Dissertatio Inauguralis Medico de Morbo Coeruleo*, Lipsiae, 1813.
174. *De cordis conditionibus abnormibus dissertatio inauguralis*, Halae, 1802, also, "Beitrag zur Geschichte der Bildungsfehler des Herzens welche die Bildung des rothen Blutes hindern," *Deutsches Arch. f. d. Physiologie*, Halle, und Berlin, 1815, p. 221.
175. *De istis cordis deformationibus quae sanguinem venosum cum arterioso misceri permittunt*, Goettingae, 1816.
176. *Observations et Recherches sur la cyanose, on maladie bleue*, Paris, 1824.
177. *Archives Générales de Médecine*, 2^{me} series, t. 3, 1823; *Mémoires ou Recherches Anatomico-Pathologiques*, Paris, 1826, p. 300.

178. *De la Cyanose Cardiaque*, etc., Thèse de Paris, 1843.
179. *Considerations sur les anomalies Cardiaques et Vasculaires qui peuvent causer la Cyanose*, Thèse de Paris, 1854.
180. *Collection of Facts Illustrative of Morbid Conditions of the Pulmonary Artery*, London, 1851.
181. "Contribution a l'anatomie pathologique de la maladie bleue (cyanose cardiaque)," *Marseille Med.*, 25:77, 138, 207, 270, 341, 403, 1888.
182. *On Malformations of the Human Heart*, London, J. Churchill & Sons, 1866, 2nd Edition.
183. *Die Angebornen Krankheiten des Herzens und der grossen Gefässe des Menschen*, Leipzig, 1844.
184. *Von der Verengung und Schliessung der Pulsadern und Krankheiten*, Heidelberg und Leipzig, 1843.
185. *Statistical Table of the Royal Infirmary of Edinburgh*, being an appendix to the report of the managers of the year 1842, Edinburgh, Neill & Co., 1843.
186. *Ibid.*, For the year 1843.
187. *Lond. & Edin. J. M. Sc., 3*, 1843.
188. *Edinburgh M. & S. J., 60*, 1843.
189. *Monthly J. M. Sc., 5*, 1845.
190. *Med.-Chir. Trans.*, 28:1, 1845.
191. *Monthly J. M. Sc., 7*, 1846.
192. London, R. Barrett, 1854.
193. *Edinburgh M. & S. J., 66*, 1846.
194. *Med.-Chir. Trans.*, 30:131, 1847.
195. *On The Influenza or Epidemic Catarrhal Fever of 1847-8*, London, J. Churchill, 1848.
196. *Med.-Chir. Trans.*, 31:61, 1848.
197. *London M. J., 4*, 1852.
198. Edinburgh, Sutherland and Knox, 1852.
199. *Monthly J. M. S., 16*, 1853.
200. *Brit. & For. Med.-Chir Rev.*, 25:214, 1860.
201. *Ibid.*, 25:467, 1860.
202. *On Some of the Causes and Effects of Valvular Disease of the Heart*, Being the Croonian Lectures for 1865, London, J. Churchill & Sons, 1865.
203. *Tr. Clin. Soc. of London*, 2:195, 1869.
204. *St. Thomas's Hosp. Rep.*, 2:233, 1871.

Additional References.

205. Bristowe, J. S.: "Obituary of Dr. T. B. Peacock," *St. Thomas's Hosp. Rep.*, 11:179, 1882
206. Marshall, J.: "Presidential Address, Biography of Peacock," p. 20-23, *Med.-Chir. Trans.*, 66:1, 1883.
207. "Obituary of T. B. Peacock," *Lancet*, 1:1013 (June 17), 1882.
208. "Obituary of Dr. T. B. Peacock," *Med. Times & Gas.*, 1:678, 1882.

TEXTS AND DOCUMENTS

PERI KARDIES *

A Treatise on the Heart from the Hippocratic Corpus: Introduction and Translation

FRANK R. HURLBUTT, JR.

Contributed through the Laboratory of Physiology, Yale University School of Medicine

Introduction

The author of *Peri kardies*, although unknown, has probably the most detailed anatomical knowledge of all the Hippocratics. He became acquainted with the complicated structure of the heart through autopsy, and he designates it as the central organ of life. The treatise did not in ancient times belong to the "Hippocratic Collection," and its point of view is entirely divergent from that of the recognized works. Galen (*de Plac*, H. et Pl. 728 M.) is acquainted with it, also Plutarch (*Mor.* 699 E.), but neither names the author. Reference to the treatise is not found elsewhere in ancient writings. The effort has been made to bring it down to Erasistratus, because of that author's eminent knowledge of anatomy.

Peri kardies shows consonances of the Sicilian branch of the Cnidian school of medicine which was founded by Empedocles whose teachings and doctrines were prevalent throughout Greek medicine. Philistion of Locri was a prominent member of the Sicilian school, and *Peri kardies* involves many of his ideas, as well as those of Plato (Timaeus 70 A. C.). Philistion was known to Plato in Syracuse in 388, and was invited by him to visit Athens. There Diocles came under his influence. Plato used Philistion for the medical parts of Timaeus. Although *Peri kardies* seems to come closer to Philistion and Plato, actually it is pervaded throughout by Empedocles.

Empedocles, a citizen of Acragas in Sicily, was born around 500 B. C. He was politician, religious teacher, and scientist, and his

* This treatise was prepared as a Senior Thesis for the Classics Department, Yale University, 1939.

influence was important since it affected not only medicine itself, but through it, the whole tendency of scientific and philosophical thinking. The fundamental doctrine of the Sicilian school of Empedocles was the identification of the four elements with hot, cold, moist and dry. This school also held that breathing was carried out through all the pores of the body, and that the act of respiration was closely connected with the motion of the blood. Empedocles also considered the heart and not the brain as the organ of consciousness. *Peri kardies* probably belongs to the period after Diocles, when the investigation of the structure of the human body really began. This was around 370 B. C. This treatise should not, however, be put later than Aristotle, since it exhibits quite divergent doctrines.

The style of *Peri kardies* indicates the probable circumstances under which it was written. The jerky and often incoherent sentences point to a set of hurried lecture notes taken by some student at the Sicilian school of medicine. The sentences many times do not connect, subjects are confused, and antecedents obscure. This naturally makes literal translation incoherent in some places. There is evidence in Chapter IV that the lecture was illustrated by means of a blackboard or set of screens. The Greek says " entha men, . . . entha de . . . (on this side . . . , and on that . . .)." Probably diagrams had been drawn to elucidate the topic of the lecture. With such a reconstruction of the probable setting, the incoherencies of literal translation can be somewhat overlooked. In the translation of this treatise, English equivalents of certain words have been difficult to find. Notable among these are the Greek words *arterie, phleps* and *aorte*, and the subsequent treatment of them will require a word of explanation.

In non-scientific use today the word " vein " has a very general meaning. Distinguishing between artery and vein is not common to the every day layman. Recognizing this fact I have used the word " vein " each time any of the Greek words *arterie, phleps* or *aorte* appear. Since it is impossible to know the extent of differentiation of these Greek words in the author's mind, any other translation of them on my part would be an assumption which would be unjustifiable. I have supplemented each use of the word vein with a parenthesis giving what I thing to be the modern equivalent of the vessel in question.

Originally all arteries and veins were called *phlebia*, but gradually they became distinguished to *arterie* and *phleps* (vein). To what extent, however, this differentiation was true when this treatise was written, it is impossible to tell. *Arterie* is used in Hipp. *Epid.* 7, 25, cf. 39 (ed. É. Littré, Paris, 1846), Plat. *Tim.* 70D, and Arist. *H. A.* 1, 12, 1, *de An.* 2, 8, 17, al, as "windpipe." In the plural it is used for bronchial tubes; Hipp. *Epid.* 7, 12 (É. Littré), cf. Plat. *Tim.* 78 C—"asthma throughout the chest and bronchial tubes (arteria)." *Arterie* meaning "artery" as distinct from vein is found in two instances as follows: Hipp. *Art.* 45, cf. 69 (É. Littré) —"the hollows of the veins and arteries"; and Arist. *de Spir.* 5, 11—"the veins and arteries are attached to each other, and this is evident to the observer."

Whether the arteries and veins were distinguished so early depends on the genuineness of the treatises just cited. It seems, however, that no obvious use was then made of such a distinction. Much later the arteries continued to be regarded as "air ducts," and seem to have been conceived as ramifications of the original *arterie* or "wind pipe" ("sanguis per venas in omne corpus diffunditur, et spiritus per arterias." Cic. *N. D.* 2, 55). The windpipe came to be designated as *he arterie tracheia* (thick artery), or *he trachea* alone (the modern word "trachea" is obvious here); while the actual arteries were called *arteriai leiai* (smooth arteries).

Arterie was used in another sense as "aorta"; Hipp. VIII, 590 (Littré): "there are two hollow veins leading from the heart; one has the name 'artery' and the other 'hollow vein.'" The artery here referred to was also called the thick, the large, and the wind distended artery. The word *arterie* seems to be derived from the Greek word *hairo* (I raise, lift up or carry). However, the connection of meaning is obscure; and the original sense of *arterie* led the ancients to refer it to *aer* (air).

For a clearer understanding of this treatise, anatomy must be distinguished from physiology. It is recognized that the anatomy of *Peri kardies* is exceptional for the period in which it was written. The physiology, however, is bound by the conventional and philosophical beliefs of the time. For instance the author has recognized that the wall of the left ventricle is thicker than that of the right.

His explanation for this is that the soul resides in the left ventricle, and must have adequate protection. This idea follows naturally with the contemporary physiology. Theodoretus as quoted in *Dox.* 391 states, " Empedocles, Aristotle, Diocles, and the sect of the Stoics allot to the heart the mastery of the body. Some of them thought that the hollow of the heart in particular held the control, others the blood; still others attributed the control to the pericardial membrane, and again others to the diaphragm." Vindicianus, an eminent Christian physician of the fourth century A. D., C. 41 stated, " The control of the body rests in the heart, and this control through its tenuousness of breath is disseminated throughout the whole body." One can find many such quotations in ancient literature, and it is natural that the medical writer of that day should call on these conventional beliefs to explain his anatomy. Again in the case of the pericardial fluid the anatomy is correct, but the author's theory is that this fluid seeps through the epiglottis from liquids which are swallowed by the individual, and that its purpose is to prevent the heart from becoming overheated.

The heart, as well as being the life-giving and circulatory organ, is considered definitely as a respiratory organ in *Peri kardies*. It was believed necessary for the heart to be constantly cooled due to the generation of much heat there. Thus the air which was breathed was thought to pass through the heart. This idea was not original with the author of *Peri kardies*. We find in Aristotle, *de part. anim.* III 6, 668 b, 34: " Cooling is necessary to the heart, and red-blooded animals need this cooling from outside to live." Also *de resp.* c. 10, 475 b, 16: " and in the case of those red-blooded animals having a heart, just as one might have a lung, this (heart) receives all the air and creates a cooling system through inhalation and exhalation." In Hippocrates *peri sarkon*, VIII, 592 we find: " Greatest heat is present in the veins and in the heart, and because of this the heart has air, heat being greatest in these organs in man. This is easily discerned because the breath is nourishment for man. The heart and hollow veins are in constant motion, and the ultimate heat is in the veins. Therefore the heart, being extremely warm in man, draws in breath."

This idea of the breath having nourishing qualities was prevalent

among the ancients. The breath, *pneuma*, was conceived as possessing certain life giving qualities. This doctrine was very common among the Sicilians. Health and sickness were thought to be caused by nature and "transpiration of pneuma." Transpiration here means the receiving of pneuma "not by mouth and nostrils alone, but through the whole body (Philistion and Empedocles)." Breathing was also considered a consequence of the motion of the blood. An important distinction exists here between the Sicilian branch of the Cnidian school and the Coan school (Hippocrates). The latter made pneuma causative of health etc., but it felt that the pneuma was taken in only through the mouth and nostrils. Coans and Sicilians agreed that the purpose of breathing was to cool the innate warmth of the heart. This warmth was connected with the veins and the blood, hence the heart was the seat of it, being the source of all blood. This idea again goes back to Empedocles.

The Sicilians considered the life giving pneuma to proceed from the heart to the brain, while the Coans had it go to the brain first. The soul was localized accordingly. The purest pneuma was in the heart for the Sicilians, and was a "distillation" of the blood and other body fluids. The heart also contained the soul, and was the source of power, of motion, and of sensory perception. The veins thus contained both blood and pneuma, and both necessarily were in constant motion. The process of respiration for the Sicilian school moved in two directions; in through the nose and mouth, out through the pores, and in through the pores, out through the nose and mouth.

In *Peri kardies* the author mentions that the membrane or valve of the left ventricle keeps the impurities of the blood of the large artery from being forced back into the heart. It seems strange to us that the digestion of food should be connected with the blood stream, but the Sicilians thought this true. Nourishment and digestion were seen by them to be a process of fermentation and putrefaction in the stomach, caused by heat acting on the liquid parts of the food, along with the air taken in with them. Indigestion came from insufficient heat to carry the process through. From the stomach the digested food went into the veins, after the waste matter had been separated off into the intestine. Veins carried nourishment to the whole body, while superfluous fluid went into the kidneys and thence

to the bladder. Apparently movement might take place in the two main blood vessels from the heart in either direction.

With this brief discussion of some of the doctrines basic to the Sicilian branch of the Cnidian school of medicine, a clearer understanding of the following short treatise may be obtained. For the benefit of those who would like to investigate this subject in greater detail I wish to call attention to the scholarly contributions made by M. Wellman (*Die Fragmente der sikelischen Ärzte Akron, Philistion, und des Diokles von Karystos*, Berlin 1901) and Carl Fredrich (*Hippokratische Untersuchungen*, Berlin, 1899) in connection with this treatise. The present author cannot overestimate his indebtedness to the work of these scholars.

A TRANSLATION OF THE TEXT

OF

PERI KARDIES *

I. In shape the heart is like a pyramid, in color dark red, and it is surrounded by a smooth covering,[1] and in this there is a small amount of urine-like fluid,[2] so that you think the heart rests in a bladder; and this has come into being in order that the heart may beat strongly at its guard post, and it (pericardium) contains just enough liquid to relieve the heart when overheated. This liquid the heart secretes, drinking in, absorbing, and digesting the lung's drink.

II. Now man drinks mostly into the stomach, for the gullet is like a funnel and receives most of what we drink and all of what we eat. But man drinks also into his windpipe, a rather small amount, no more than can escape notice flowing in through the slit, for the epiglottis is a close-fitting cover and lets through no more drink. The evidence is this: "if, having colored water with dark blue or crimson dye, one gives it to drink to a very thirsty animal, especially a pig, for it is not a careful or fussy beast, and then if you

* I have accepted the Greek text of F. C. Unger, Leyden, 1923, and I am much indebted to Dr. Owsei Temkin for placing a copy at my disposal.

[1] Pericardium. [2] Pericardial fluid.

cut its throat while it is drinking, you will find this colored by the drink. The operation, however, is not for every man.[3] Therefore we should not be disbelieved concerning the drink if it benefits man's windpipe. But how does water, when it rushes in freely, cause discomfort and much coughing? Because, I say, it moves oppositely to the breath. But that which flows through the up-rushing air, going along next to the wall (of the throat), does not get in the way of the rising of the air, but the moistening even provides for it a particularly smooth course.

III. This liquid leaves the lungs along with the air. Now, therefore, the heart must, after the air has completed its remedial service, necessarily cast it forth by the same road whence it came; as for the liquid, the heart spits part of it into its sheath, the rest it allows to withdraw to the outside again with the air, and in this way the breath irrigates the vault (palate) whenever it goes back out, and it is proper that it should go back out, for these things are no nourishment for man's constitution. For how are the crude substances, air and water, nourishment for man? They are rather the relief of an inborn failing.

IV. As for what the discourse is about, the heart is a muscle of great strength, not because of sinew, but compactness of flesh,[4] and it has two separate bellies[5] in a single inclosure, one on this side, and one on that,[6] but they are not at all alike. For the one on the right lies in front, close to the other. I say "the right" of things on the left, for the whole heart, with reference to its location, is placed among these. But this belly is also quite broad paunched, and much more pliant than the other, and it does not occupy the extremity of the heart, but leaves the bottom solid, and is as if sewed on from without.

V. The other lies mostly underneath and on a straight line,

[3] Here is shown by the attitude taken toward the experiment on the animal that the experimental method was not common. This is one of the reasons why Greek medicine could not go farther. Convention was against its advance along that line.

[4] This almost certainly suggests autopsy, another feature of modern medicine which was neglected in ancient times.

[5] Ventricles.

[6] *entha men entha de*—this would indicate that the lecture was executed by means of a blackboard or set of screens with a picture of the heart drawn in illustration.

mostly, with the left breast, where also the beating shows through. It has a thick enclosure and is empitted in a pit like a mortar in shape. But this is not all, for it is comfortably enwrapped already by the lungs, and thus surrounded, it (lung?) curbs the violence of the heat;[7] for the lungs are naturally cool, but they are also cooled by inhalation.

VI. Both bellies, nevertheless, are rough on the inside, as if somewhat eaten through, and the left more than the right, for the inborn fire is not in the right,[8] so that it is no wonder the left becomes rougher, breathing it[9] in unmixed; for this reason it is also thickly constructed within, in order to preserve the strength of the heat.[10]

VII. No outlets open for them, unless one cuts off the top of the ears and the head of the heart; but if one does cut these off, there appear even double outlets in the two bellies, for the thick vein (aorta or pulmonary artery) up from one of the bellies deceives the sight if it is cut. These are the springs of the nature of man, and the rivers there move throughout the body by which the body is watered; these also bear life for man, and if they dry up, man dies.

VIII. Near the outgrowth of the veins (aorta and pulmonary artery) there are, on either side of the hollow bellies, soft porous bodies which are called indeed, ears, but they have no holes of ears; for these do not take in noise, but are the instruments by which nature snatches up air, and indeed, I think it the creation of a good handicraftsman. For, perceiving that the organ would be solid in structure because of the compactness of its tissue, it being furthermore entirely attractive, he placed bellows beside it, after the manner of the coppersmiths with their melting pots, and so it manages its breathing through these. And there is proof of this proposition, for one might observe the heart tossing about as a whole, but the ears independently inflating and collapsing.[11]

IX. On this account I say that veins (pulmonary veins) effect the breathing into the left hollow, and a vein (pulmonary artery) does it for the other; for that which is soft is more attractive and

[7] Introduction.
[8] Introduction.
[9] Inborn fire?
[10] Introduction.
[11] This passage seems to point unquestionably to vivisection as well as dissection.

yielding. It is suitable for us that the surrounding coverings (of the heart) should be less cooled than the heart. For there is no heat on the right side, so that, on account of this failing (lack), it does not work (too) easily,[12] in order that it might not be entirely overcome by what comes in.

X. The remaining matter to treat of in the heart is hidden membranes, a thing very worthy of exposition. For membranes and other muscles [13] resembling spiderwebs spread out, gird everywhere the outlets and send fibers into the solid parts of the heart. These seem to be the bands of the organ and the veins, beginnings of the veins. There is a pair of them [14] at the entrances to which there have been constructed three membranes for each, rounded, at the extremity at least, to the extent of a half circle, and when they come together it is marvelous how they close the outlets, the end of the veins (aorta and pulmonary artery). And if some one who thoroughly understands the ancient method [15] removes the heart of a dead man, and takes up one of these membranes and bends another up against it, water will not go through into the heart, nor even the breath when forced in. And even more (is this true) in the case of those of the left belly. Accordingly they have rightly been constructed more exactly, for the intelligence of man is innate in the left hollow and rules the rest of the soul.[16]

XI. It (the soul) is nourished neither by the foods nor by the drinks which come from the body, but by a pure light excess, born out of the separation of the blood. And it gets plenty of this nourishment from the reservoir of blood [17] right next to it, throwing its rays

[12] The Greek here is obscure. The text used by E. Littré, Paris, 1861, states: "It is necessary that the parts nearby should be cooler than the heart. For the heat on the right side has been diminished to a certain extent, so that, on account of this failing, it has not taken a feeble instrument, in order that it might not be entirely overcome by what comes in." This is also obscure.

[13] Aortic and pulmonary valves and chorda tindeniae.

[14] Aortic and pulmonary valves.

[15] The "Ancient Method" refers to the procedure performed by augurs in their prophecies. The heart of the sacrificial animal was removed for inspection from the chest by cutting along the sternum. The heart could then be lifted out by reaching in from the incision, thus preventing fracture of any ribs.

[16] See introduction.

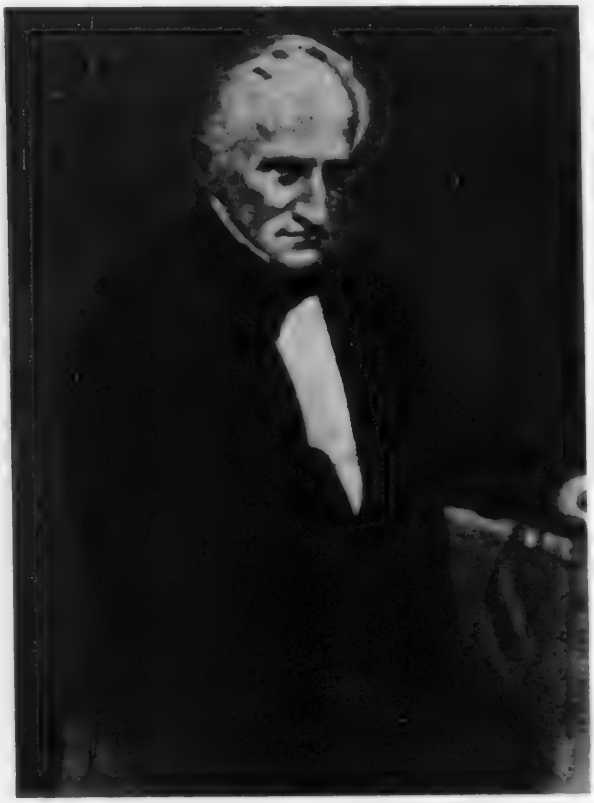
[17] Right ventricle.

across and feeding, just as on the nourishment from stomach and intestines, and this is according to nature, but in order that the substance in the vein (aorta) may not inhibit this nourishment which is in a state of flux, it (left ventricle) closes the path to it (heart), for the large vein (aorta) feeds on the stomach and intestines, and is full of nourishment which is not of the highest type. That it is not nourished by visible blood is clear thus: when the animal was slaughtered, if the left hollow is split, it is seen to be quite empty, except for some watery liquid and yellow bile and the membranes about which I have already spoken; but the vein (aorta) is not lacking in blood, neither is the right hollow. Therefore, in my opinion, this is the reason for the membranes in this vein (aorta).

XII. As for the one (pulmonary artery) leading from the right hollow, this one too is yoked by a joining of the membranes, except that it does not close completely, because of its weakness, but it opens into the lungs so as to provide them with blood for their nourishment; it closes, however, toward the heart, not tightly, in order that the air may come in, but not very much. For the heat there is weak, being dominated by an admixture of the cold, for the blood is not in its nature hot, neither is any other water, but it takes up heat. To many, however, it seems hot by nature. Concerning the heart let such things be said.

I should like to express my appreciation to Mr. Eugene O'Neill, Jr. for his valuable assistance in connection with the assembling of data, and with the translation of PERI KARDIES.

I also wish to thank Mr. Stanley A. Leavey of the University of Rochester who originally conceived the idea of making the translation and Mr. Stuart McLeod at whose suggestion Mr. Leavey turned the task over to me.



WILHELM FREDERICK VON LUDWIG

UNIV. OF MICH.

ANGINA LUDOVICI

A Translation, Together with a Biography of WILHELM FREDERICK VON LUDWIG

JOHN BURKE

From the Surgical Service, Edward J. Meyer Memorial Hospital (Buffalo City Hospital)

Translation

I shall take advantage of the organ of our medical society to request the experience of my honored colleagues concerning the repeated recent occurrence of a certain type of inflammation of the throat. This resembles the more usual forms under certain circumstances, but despite the most skillful therapy is almost always fatal. From a practical view point it seems to me advisable that it be separated from the more usual types of throat inflammations, particularly if the treatment can be demonstrated as differing from the basic therapy of the latter.

According to my observations and those which Dr. Hahn has kindly contributed, the important features of the disease and its course are briefly as follows:

Amidst the symptoms which herald the approach of a rheumatic, or more likely an erysipelatous angina, moderate temperature swings with frequent chills, drawing headache, fatigue, disturbed appetite, slightly coated tongue, some discomfort upon swallowing (this may be very mild at the onset, and is occasionally lacking), there develops in one or both sides of the neck (more frequently unilateral) a firm swelling usually in the tissues about the submaxillary and less commonly about the parotid or sublingual gland. This firm, connective-tissue tumefaction spreads, altering in similar fashion all connective tissue with which it comes in contact. It extends uniformly about the periphery of the neck, at first under the jaw to the chin and beyond, to the larynx below, not infrequently backwards over the tissues of the parotid, and protrudes externally to a marked degree. It advances in similar fashion to involve the tissues which cover the

small muscles between the larynx and the floor of the mouth, and in fact the muscles themselves seem to be involved in the indurative process. The tongue rests upon a red, indurated mass which feels like a hard ring adjacent to the inner surface of the jaw bone. It becomes difficult and painful to open the mouth; speech is impaired, hoarse, and has a throaty quality. This is because the tongue is pressed upwards and backwards, there is pressure upon the larynx, and the smaller throat muscles are involved. Swallowing is definitely difficult and requires great effort on the part of all the neck muscles. This is without doubt chiefly or entirely due to the mechanical pressure of the swelling since inflammatory swelling of the pharynx is, as a rule, noted only in the early stages of the disease (or later as the result of mercurial therapy), although as the illness progresses a large amount of mucus accumulates in the throat and is expelled with difficulty. In the early stages of the lesion the skin overlying the swelling is but slightly reddened, of normal consistency, and movable according to the degree of tension over the swollen area. This indicates that the skin and subcutaneous tissues are free of the indurative process. For the first four to six days during the progress of the local lesion the organism as a whole does not seem significantly affected; fever is moderate; bodily vigor and the general attitude are but slightly altered; appetite and sleep are not entirely lacking; thirst is moderate; and secretions and excretions are comparatively unchanged.

As the disease progresses, the skin over the induration not infrequently begins to become red in spots; if this has not occurred previously, there is an exudation of phlogistic lymph in the interior of the mouth and the swelling under the tongue becomes somewhat softer, as if serum had exuded under the mucosa and partially coagulated. Externally certain areas become at times softer and somewhat sunken (in this case the examining finger has the impression as if there were air under the skin), at other times more prominent and apparently fluctuant. It is as though active suppuration attempted to take place, and scarcely beginning, came to a stand still and regressed. At the beginning or during the course of this further local advance, either toward the back and side of the base of the tongue, or farther forward along the inner surface of the jaw, an

area breaks down and there is a discharge of a foul smelling, thin, light-gray or reddish brown fluid which resembles increasingly the ichor of sphacelated mortification. Previous to, or at the onset of this softening process which may be said to be a truly mortifying and highly asthenic suppurative process, the patient is definitely affected by the products of the suppuration. Fever increases, with morning exacerbations; sleep is fitful; sweating is profuse; the urine shows a heavy sediment; there are nightmares, sudden awakenings and mild deliriums. Notwithstanding the decreasing tension in the swelling and in the neck as a whole, swallowing continues to be difficult, and the patient opens the mouth only with effort; dyspnea appears usually in paroxysms with reasonably free intervals. This last symptom, appearing as it does when the tension in the neck is decreasing, suggests that a non-mechanical respiratory hindrance is responsible, such as an involvement of the nervous system, or perhaps a pleural effusion. The group of signs and symptoms follows with great speed the sequence of a putrid typhus lesion, and in four to five days (the tenth to twelfth day of the disease) death occurs with the patient in a comatose state with evidence of respiratory paralysis.

There are nuances in the typical picture of the disease as I have presented it thus far, particularly in the time of onset of fever, and onset and severity of the local lesion, etc., which I have not mentioned as yet, since it was not my intention to present a discussion of the disease at this time, rather a condensed version, for the purpose of recognition at the sickbed.

Among the cases in which autopsy was permitted, in one the skin and subcutaneous tissue was not altered, nor adherent to the swelling, rather it was loosed from it by exuded serum. Contrariwise, the tissues under the platysmamyoides, all of the tissues which separate the neck and salivary glands and the smaller neck muscles in the affected area were all mortified and converted into a grayish-black scarcely coherent mass which was infiltrated in part with air bubbles and in part with grayish-brown ichor. In some parts there were found abscess cavities whose walls were made up of gangrenous, partly decomposed masses of muscle, and which contained a quantity of stinking, brewer's yeast-like ichor mixed with blood. Nearly all

of the neck muscles which took part in the swelling, particularly the deep-lying ones, appear changed throughout their substance, becoming more compact, darker in color, a dirty red which resembles dark liver substance. The salivary glands, so far as they were involved in the induration, were in part deeper red, in part unchanged. Another case showed less putrid decomposition and instead a rather marked degeneration of the individual parts; the fluid seen was thicker and redder, and the solid portions, glands, muscles and connective tissues were more of the nature of a homogeneous mass in the state of softening. In one case where the characteristics of the disease were most distinct, the periosteum on the inner surface of the jaw was loosened from the bone and discolored. It was at this particular point that the gangrenous ichor first appeared. The mucosa of the mouth, the tongue, the choannae, the pharynx and the trachea were in part slightly reddened, and loosened from their underlying tissues. The trachea contained a large quantity of white, rarely red-tinged mucus. In those portions of the vagus and recurrens nerves which were involved in the induration, the substance as well as the sheaths of the nerves was discolored a dirty red. The chest and cranium were not opened.

In three cases in which the undersigned had occasion to participate after the first third of the disease had elapsed, the therapy was decided upon after consideration of the season of the year, the epidemic-like character of the illness, the individuality of the patient and the predominating form of the disease, and was chiefly as follows: local and general blood-letting, softening poultices and cataplasms, external and internal use of mercurials, relief of spasm by the remote application of sinapisms and vesicants; cathartics, diuretics and diaphoretics according to momentary requirements; in the later stages of the disease, local irritants according to the degree of the mortification process, and internal medications for the typhus process, directed particularly to the head and chest organs. Although by means of one or the other methods improvement occurred in some respects, the disease progressed unhindered in its systemic manifestations, and ended fatally in the manner described previously.

Concerning the question of the immediate cause of this disease, I shall abstain from attempting to demonstrate a scientifically valid

hypothesis as the necessary material from the anamnesis and from the course of the disease is not sufficiently clear-cut for the development of proof; I will but surmise that the disease has an erysipelatous lesion as its source. This, checked in its surface spread through epidemic influences, constitutional factors or the like, is forced into deeper regions foreign to its nature and is transformed into a gangrenous inflammatory connective tissue induration. Too, it may be altered by internal influences acting through the nervous system, so that the disease may derive the tendency toward gangrenous inflammation through the erysipelatous factor as in the case of malignant carbuncle, and the tendency toward induration and paralysis from the nervous system as in malignant parotitis.

Be this as it may, in its nature as well as in its diagnosis, this disease seems to me to differentiate itself definitely from those other diseases whose outward appearances are somewhat akin. So far as I have been able to learn nowhere has an accurate picture of the disease been given, if one considers only the sum of the important features, and does not confuse single incidents and fleeting similarities in the course of other throat lesions. Thus this lesion differentiates itself through the lack of any superficial gangrene of the mucosa of the throat and absence of edema in the external swelling from Angina gangraenosa, which is notorious for the gangrenous changes not only in the pharynx and palate but in severe cases from the larynx below to the tongue above, and not infrequently is associated with tremendous external swelling. It differentiates itself from other neck inflammations with symptomatic or idiopathic swelling of the salivary glands through the minimal or even lack of involvement of the glands, while the tissue surrounding the glands as well as the musculature between the larynx and tongue is involved; from pseudo-erysipelas, which perhaps is closely related to this disease in its pathological aspects, by the absence of original skin involvement the nature of the induration and the rapid mortification of the connective tissue, and the acute course of the disease.

Although it may be difficult to avoid confusion in every case, and I wish at this stage of the observations to state definitely, neither that this lesion is quite specific, nor that it cannot develop into, or from, or complicate other forms of neck inflammations as it may

begin with the picture of an erysipeloid or rheumatic throat inflammation, for practical purposes it is none the less important to consider its character as specific.

The essential and guiding events for the diagnosis of this lesion, which deserves perhaps the appellation of gangrenous induration of the connective tissues of the neck, seem to me to be chiefly the following: 1. The slight inflammation of the pharynx which quite disappears after the first few days, and when persistent is more a result of peripheral or sympathetic affection; 2. The unique, one might say woody, hardness of the connective tissue swelling which cannot be pitted by the finger; 3. The hard tumor under the tongue with the callous indurated ring about the inner circumference of the jaw; 4. The uniform progression of the swelling which is observed from the beginning occurs in such fashion that the stony hard edge of the induration is bordered by quite normal tissue; 5. Finally, the minimal, or more frequently, the absence of involvement of the glands, while the swelling invades their investing tissues, or perhaps originates from the same.

Concerning the therapy of the disease, I feel that I may conclude from my observations that a successful result depends upon the maintenance of the original character of the illness. On the basis of my observations and opinions, I feel that there are a few procedures which I shall follow in the next case, namely: I shall avoid mercurials to prevent their action upon the bodily humors and prevent congestion in the salivary glands and mucus membranes; I shall bring the local disease process to the surface as quickly as possible by means of skin irritants, and alleviate the severity of the regional inflammatory tension by local bloodletting; and finally I shall try to bring the supposed erysipelatous source of the disease to critical resolution through appropriate internal therapy.

Because an opportunity arose to apply these measures and to observe the disease in all its peculiarities almost from the onset, I shall present the case briefly:

Fräulein N. N., of good constitution and in splendid health, was taken ill with swelling in the left side of the neck in the region of the submaxillary gland during the latter half of December of the previous year. At my first examination, four days after the onset,

the swelling was about the size of a hen's egg, extraordinarily hard, sharply demarcated, fixed, apparently attached to the jaw and slightly tender on pressure; the overlying skin was scarcely reddened. It was said that the patient had caught cold previously and repeated exposures to cold had taken place after the swelling was noticed, as the patient felt perfectly well. On the following day, the fifth of the illness, there was not only a lack of improvement after embrocation with liniment and mercurial ointment, but the swelling had advanced to the angle of the jaw and to the edge of the hyoid bone below, and was much more noticeable. To open the mouth was slightly difficult, and not without a shock, the true nature of the disease was recognized. The patient was immediately ordered to bed; six leeches were placed in the region of swelling and followed by dry heat in the form of bran poultices; and teaspoon doses of Minderer's spirit in warm elder tea were ordered, although there was scarcely any alteration in pulse, and no change in the general condition.

Sixth day of the disease: The swelling advanced to the angle of the jaw, with a sharp, stony border, erysipelatous reddening of the palate with difficulty in swallowing, the floor of the mouth below the tongue raised and reddened and felt hard along the edge of the jaw. Treatment: dry heat externally, a gargle of althea and honey, a large vesicant at the nape of the neck; internally, tartar emetic with Terra foliat. tart., and Vinum Antimon. in camomile tea.

Seventh day: The swelling approached the submaxillary gland on the right side and the parotid on the left although the glands themselves were not swollen, extended to the hyoid below and was much more prominent; the floor of the mouth under the tongue was a dark, deep red and quite hard; an indurated raised ring, like a scirrhus in hardness, was found along the inner surface of the jawbone; difficulty in swallowing; movements of the tongue and mouth began to be limited; speech was altered; lively fever, most marked in the morning. Medicaments caused nausea, vomiting and frequent fluid stools. Orders: Continuation of previous therapy, embrocation of the swelling with a mixture of two parts croton and one part almond oil, irritant cataplasms, continuously, day and night.

From the seventh day to the ninth day the local lesion had progressed in all directions, the induration bulged forward reaching

from the parotid on the left to the submaxillary on the right without involving either, downwards below the larynx which no longer could be felt. The tongue was pushed backwards and upwards by the indurated ring and the hard tumor below it, speech was indistinct, with a croup-like tone; the mouth could be opened hardly wide enough to admit the little finger; the inflammatory lesions in the pharynx had regressed and begun to disappear after the seventh day; much mucus in the throat; severe disturbances in swallowing in the esophagus; high and persistent fever; interrupted sleep with nightmares; occasional hiccoughs; flushed face; protruding eyes; severe thirst; vomiting had entirely ceased. The embrocation had produced a painful erythema with a miliary rash over the swelling and adjacent tissues. Despite this, and because of the threat of gangrene, fifteen more leeches were applied, the afterbleeding being maintained by cataplasms; the blister on the nape of the neck suppurated steadily; a piece of silver nitrate the size of a six kreuzer coin was placed over the middle of the swelling; internally a powerful emetic of tartar emetic and ipecac was given, and after it had worked a mixture of Potio Riverii and Vin. Antimon. Mann. in a decoction of valerian was administered.

Tenth day: Frequent emesis and numerous mucoid stools occurred, with a subsequent feeling of comfort, decline in the fever, thirst and coated tongue, general sweating; the caustic had created a splendid necrosis and the croton oil rash was at the height of its bloom. The local lesion did not advance and deglutition became easier. The internal therapy and the cataplasms were continued.

From the tenth day on the swelling began to regress, and the fever gradually, though slowly, declined. First the sternocleidomastoideus could be identified, then the larynx; the mouth opened more freely, the induration in the floor of the mouth became softer, the base of the tongue lost its redness, the tongue moved more freely and speech became more distinct. Later the swelling on the right side adjacent to the jaw regressed, although not uniformly but rather in such manner that fully softened and quite hard areas were adjacent. During this regression it was seen that while the connective tissues about the submaxillary and sublingual glands had been involved, the glands themselves had not been affected. In similar

fashion the induration within the mouth gradually disappeared and the rash dried up. Now the suppurative discharge was checked by caustics and for a short time refractory doses of tartar emetic were given alternating with powders of rhubarb, sal ammoniac and gold sulfate. Rigorous diet and a warm environment were maintained, cataplasms were continued for a few days and then replaced by dry, warm poultices. The induration of the area first involved regressed rather slowly, but in the same manner as the rest of the swelling, and three weeks after the onset, when the last traces of the induration could still be felt, the patient felt well and strong.

I do not doubt that this disease has occurred elsewhere. In Number 15, page 116, of the last volume of this periodical, Dr. Rosch describes a case, under the title "Angina erysipelacea parotidea," which appears to be very similar, so far as comparative data exists, and which he may well consider identical with those described. There are also some other pertinent cases, at present in the hands of the editor, which are to be presented shortly. The different names under which have been given to these case reports by the authors seem to me further to justify the surmise that previously this disease has been confused with other forms because of the similarity of many of its symptoms, whereas because of its course, and from the view point of therapy, it deserves to be considered as unique for practical purposes.

If and to what extent this surmise is justifiable, and if the therapy used in the last case has been used with or without success by others, these are questions upon which I should appreciate the viewpoint, grounded upon experience, of my worthy colleagues.

D. Ludwig.

Stuttgart, January 1836.

While this article has been in press I have had the opportunity of observing another case of this disease in a sixteen year old girl, who showed all of the characteristic phenomena, and who has made remarkable steps toward recovery, with the regime outlined above.

D. L.

Biography

Ludwig's Angina is a comparatively rare disease despite the fact that the disease picture is fairly well known to all students of medicine. A brief survey of its incidence, as seen at the Edward J. Meyer Memorial Hospital (Buffalo City Hospital) reveals that among 410,000 admissions from the opening of the hospital in 1917 until 1939, there were only twenty cases in which this diagnosis was made. This comparative rarity is paralleled by the present day obscurity of its discoverer. In the Surgeon General's catalogue there are but two biographical references, and it is from one of these, *Die Ludwig-Stiftung und ihr Stifter* that this biographical note was compiled.

Wilhelm Friederich von Ludwig like so many men of note, was the son of a clergyman, and was born in Uhlbach, Sept. 16, 1790. Until he was ten, his education was carried on by his father, at which time he entered the Latin school at Markgroningen, where his elder brother was a preceptor. At 14 he and his brother went to Neuenburg where he continued his classical studies. Even at this age he had a strong inclination toward medicine, to the delight of his father. Together with his academic work, he carried on practical and theoretical studies in surgery under the direction of the surgeon and accoucheur Schonlein. This phase of his training was completed in 1807 when he was given a certificate of proficiency by the " Chirurgi jurati, Examinatores und Vorsteher einer loblichen Barbier- und Wundarzneikunst zu Ludwigsburg." Following this he entered the University of Tübingen to study medicine, surgery and obstetrics. At this time surgery was his favorite study, and in 1809 he was awarded the gold medal given by King Friederich for the advancement of surgery. Ludwig was promoted to the Doctorate July 16, 1811 following his dissertation " de novo trepano praecipue pro orbitae vulneribus."

His plans for a *Studienreise* were rudely interrupted by Napoleon's attempted conquest of Russia. The previously exempt students were called up for military service, and Ludwig became a physician to the 3rd Infantry at the Schorndorff garrison. In 1812 he was given command of the Würtemberg field hospital at Smo-

lensk, but during the retreat to Wilna fell ill with typhus and was taken prisoner by the Russians. Following his recovery captivity became less arduous when the young surgeon became attached to the household of Princess Gagarin. In his capacity as personal physician, von Ludwig accompanied her throughout the southern portion of Russia and spent the winter in Saratov, where he had ample opportunity to practice medicine and surgery. Another trip, this time to Astrakhan, was interrupted by war when Friederich joined the coalition against Napoleon and von Ludwig was released from captivity. Upon his arrival at home he was placed in charge of the typhus hospital in Hohenheim, and completed his military career in 1815 when he accompanied the Würtemberg troops to the Rhine.

In June of that year he was made full professor of surgery and obstetrics at Tübingen. Before taking over his new post, he was at last, undeterred by war, able to make a " grand tour " of the various surgical and obstetrical clinics in München, Salzburg, Wien, Erlangen, Bamberg and Würzburg, and in November 1815 began his activities at Tübingen. His first impressions must have been somewhat unfavorable for the *Klinik* was sorely lacking in material, from surgical instruments to the necessary surgical literature for the library. This deficiency was at once remedied by von Ludwig out of his own salary, which amounted to the munificent sum of 500 florins. When he saw that a similar expenditure would be necessary the following year, he complained, in a petition to the King, dated March 26, 1816 that it was " physically impossible " to live on the salary. His petition seems to have been favorably received for five days later he was appointed a physician-in-ordinary to the King, as successor to Froriep. However, he continued to direct the surgical and obstetrical clinic during the winter of 1816-17 during the absence of his successor, Prof. Georgi. In May 1817 he became physician-in-ordinary to King Wilhelm, and returned to Stuttgart. Here, he became active in internal medicine as well as in surgery and obstetrics and developed a large general and consulting practice, where his keen diagnostic ability was particularly in demand. Naturally, the high point of his practice centered about the royal family. He was soon made chief physician-in-ordinary and became a real family physician for the king and queen. Because of his remarkable ability

as well as high position, many honors fell to Ludwig. He was made vice-director, and later director of the Medizinalcollegium (an institution similar to a public health council) and after nearly a half century of public service, was retired at his own request, and given the title Excellenz. From 1835 to 1846 Ludwig was president of the Würtemberg medical association, and was chairman of the medical section at the first Stuttgart scientific congress.

Despite several severe illnesses during his latter years, he was hale and hearty at the fiftieth anniversary of his doctorate. Shortly after this, however, he was forced to give up his practice because of a cataract and a painful bladder lesion and in 1865 Professor Segalas was brought from Paris to remove a bladder stone. The operation was only partly successful, although a few months later Ludwig's colleague Dr. Hahn was able to remove the remainder of the stone. His death occurred a few months later following a throat inflammation. In as much as no particular mention is made of it, the disease was probably not that with which Ludwig's name is associated.

Ludwig did not marry, and his biographer suggests that it was because his whole life was devoted to medicine. His contributions to the literature were meager, comprising the article on the lesion afterwards known as Angina Ludovici, or Ludwig's angina (which appeared as a leading article without title) and a short note on the healing of the artificial anus. It is obvious, however, that he was highly regarded among his colleagues, as was demonstrated by the festivities surrounding his fiftieth anniversary as a physician. At that time the portrait accompanying this article was painted by Neher, and from it a silver medal was made. On the reverse side the Jubilee was stated to be that of the greatest physician, the leader and standard-bearer of Stuttgart's medical profession.

BIBLIOGRAPHY

LUDWIG—*Medicinische Correspondenz—Blatt des Würtembergischen Ärztlichen Vereins*, Vol. 6, 1836, p. 21.

Comités für die *Dr. Ludwig Stiftung—Ibid.*, Vol. 70, 1900, p. 276.

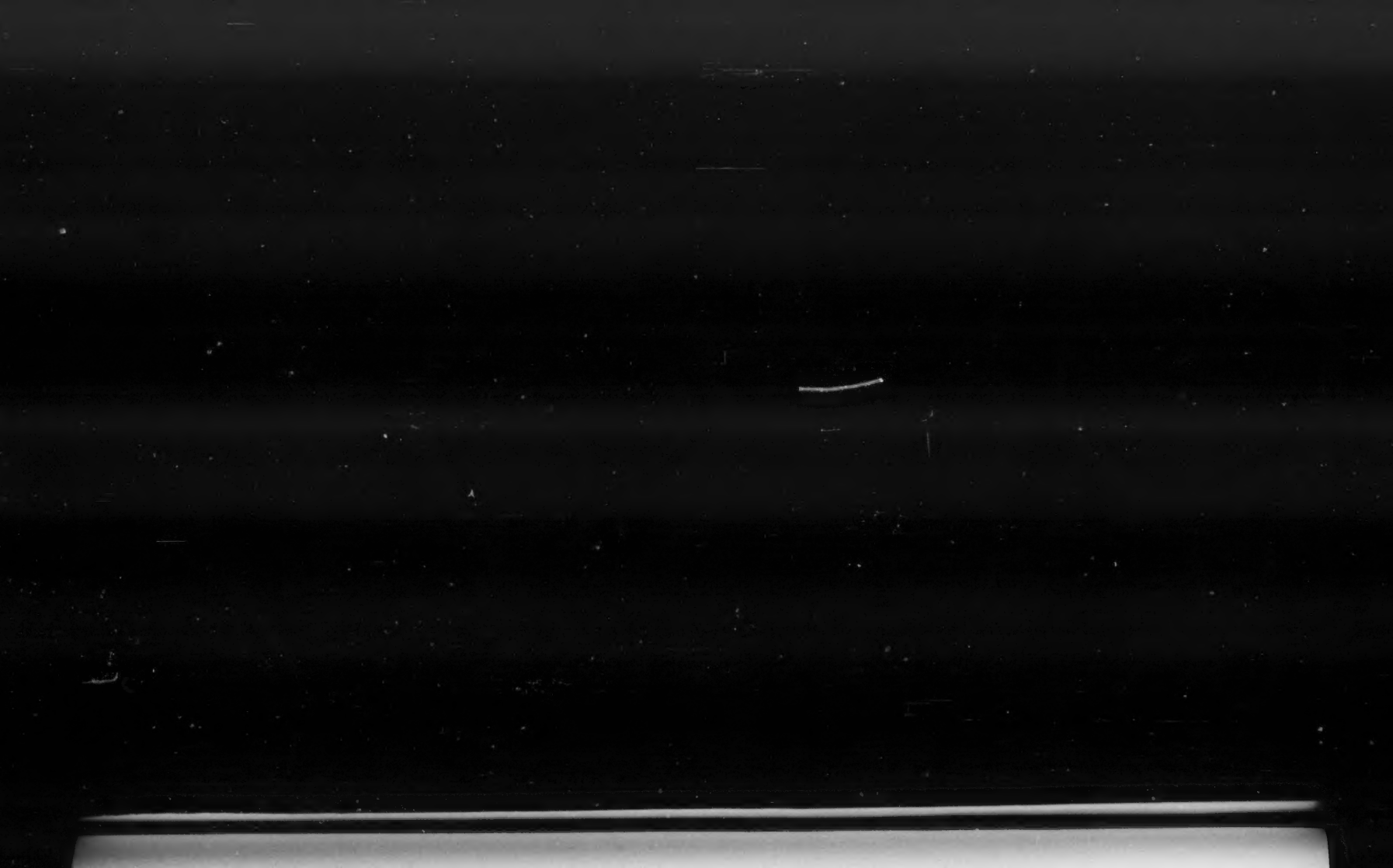
Deutsche Med. Wochenschrift, Vol. 32, 1906, p. 1549.

ANNOUNCEMENTS

BIOGRAPHY OF DR. HARVEY CUSHING.

Mrs. Cushing has requested me to prepare a biography of her husband and I should be most grateful to anyone who wishes to make letters, anecdotes or other memorabilia available.

Copies of all letters, no matter how brief, are desired, and if dates are omitted it is hoped that, when possible, these may be supplied (e. g., from the postmark). If original letters or other documents are submitted, they will be copied and returned promptly.

A new Medical Library building is being erected at the Yale University School of Medicine to receive Dr. Cushing's library and collections, including his letters, diaries and manuscripts. Any of his friends who wish, now or later, to present correspondence, photographs or other memorabilia for permanent preservation among the Cushing papers will receive the appreciative thanks of the University.

JOHN F. FULTON, M. D.
Yale University School of Medicine
333 Cedar Street, New Haven, Conn.